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Equipping a Railroad Shop for Continuous Production

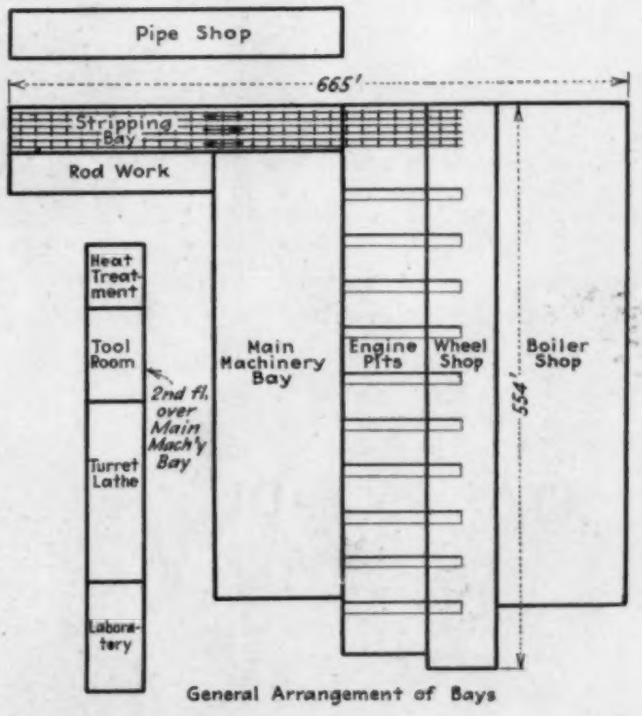
A detailed description of the layout and equipment of the new C & O shops

Frank J. Oliver, Jr.
Associate Editor

THE NEW locomotive shop of the Chesapeake and Ohio Railway Company at Huntington, W. Va., was designed with a view of providing the maximum capacity of locomotive output with the least possible detention from service and at a minimum expenditure of labor. Advantage was taken of the principles of mass production and short, straight line movement of materials, following in general the methods employed by the more progressive automobile manufacturers and applying them where possible to locomotive repair work.

Detailed time studies were first made to determine the number of machining operations per month, and in this way the number, size, and capacity of the machine tools necessary to produce a balanced shop operation. As a result of this study it was decided to group the machinery for each kind of work so as to avoid all unnecessaary handling of parts. Among the machines purchased were a number of special-purpose machine tools designed to perform specific operations economically. One such machine is a milling machine in which one driving box is milled on both shoe and wedge surfaces at one time. While the machine is working on one box, a mechanic is setting up a box on the other end of the table. The operation requires about fifteen minutes. Formerly it required about seven hours, involving seven set-ups. Another special milling machine finishes locomotive shoes and wedges in about nine minutes as against 30 minutes under prevailing practice.

Nearly one-third of the motive power of the road are mallet articu-



General Arrangement of Bays

Not a posed picture! A view of the heavy machinery bay taken after hours, showing wide aisles, neat arrangement of equipment, and absence of parts littered over the floor

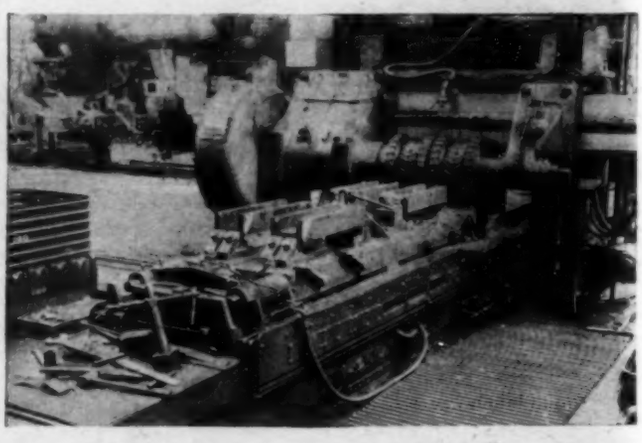
lated locomotives, and the remainder are consolidation type. The shop has been laid out to handle the repair of 50 locomotives per month. Altogether 37 locomotives can undergo repair at one time, the time varying from 15 to 28 days depending upon the type of repairs and the size of engine. There are 22 heavy repair pits in the main erecting shop and there are three others available for unwheeling, wheeling, and valve setting.

To turn out each month 50 classified repairs of the class of locomotives mentioned means that with 25 working days of 8 hours each, or 200 hours, $\frac{200}{50}$ or 4 hours is the unit time of completion of each major operation on an average engine, and sufficient equipment has been provided to accomplish this result.

As shown in the general plan of the shop, the form is roughly that of an inverted L, with incoming and outgoing locomotives on parallel tracks, two for the latter, and the center one for the former. The spot system is used in that disassembly or assembly, as the case may be, takes place progressively as the engines move down the tracks. When the engine enters the shop, the first operation is to remove the tender, which is switched by a storage-battery locomotive to the tank shop on the other side of the yard. The stripping gang then removes all pipes, gages, and boiler mountings within the first four-hour period. After the engine is moved to the second position, the jacket is removed as well as all main and side rods. These rods are stacked and carried by tractors to the rod department in an adjacent bay. This shop, in turn, is next to the forge shop, and the nearest unit to the door is the 1,000-ton hydraulic forging press used for rod work. In this way the handling of heavy pieces is minimized.

At the third station, the lagging is removed as well as all pipes under the jacket; at the fourth, the air pumps, power reverse gear, fire door, and feed water heater come off. Preparations are also made for taking off the cab and the stoker so that they can be quickly lifted off at the fifth station. The binders are also loosened at this time.

The fifth and last position is a part of the transverse erecting shop bay, which is served by a 250-ton crane,



With gang cutters, an indexing table pneumatically clamped, and automatic cycle control of the table travel, an operation formerly taking a half hour on a planer is a matter of nine minutes on this heavy-duty miller

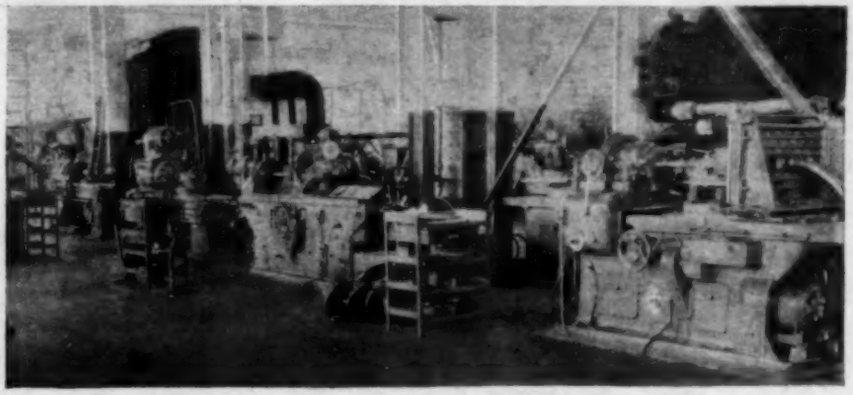
Crossheads and guides, pistons and rods are reconditioned in the heavy machinery section. Against the line of columns is a battery of vertical turret lathes

high overhead, and three 15-ton messenger cranes on a lower runway. This part of the shop measures 95 ft. between columns and the pits are on 24-ft. track centers. In this last position the binders are dropped into the pit, and the locomotive is picked up by the big crane and transported to its assigned pit for heavy repairs. The lateral movements of the locomotives to this point are all accomplished expeditiously by rope and an electric winch.

There are twenty-five divisions or groups in the shop, in which equipment has been segregated for handling repairs on related equipment without it being necessary to job out any work in another department. These groups are as follows:

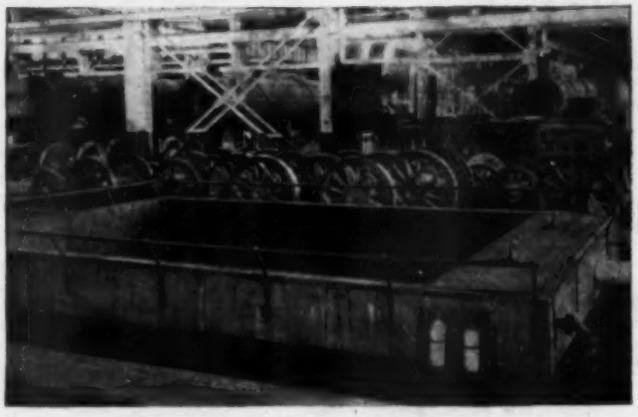
1. Wheels
2. Driving boxes
3. Shoes and wedges
4. Frames, pilot beams, and special castings
5. Cylinder heads and bushings, valves and covers
6. Pistons and rods, crossheads, and guides
7. Main and side rods
8. Valve motions
9. Spring and brake rigging
10. Engine and trailer trucks, boosters and stokers
11. Steam and exhaust pipes, superheaters
12. Pits
13. Turret lathe work
14. Air pumps and pneumatic devices
15. Bolts and pins
16. Drifting valves, reverse and throttle levers
17. Miscellaneous work
18. Electric repair shop
19. Manufacturing tool room
20. Machine tool repairs
21. Laboratory
22. Jacket work
23. Boiler work
24. Pipe work
25. Brass work

Outside the jurisdiction of the production department, but housed under the same roof are also a completely equipped chemical laboratory and a physical testing laboratory. Included in the equipment is a 1,000,000-lb. testing machine, besides special equipment for testing cloth, concrete and other materials. All material bought on specification for the entire system is tested here.



Modern grinding equipment is to be found in the section allotted for repairs of air pumps and pneumatic devices

Four wheel sets and a couple of tender trucks can be boiled free from dirt and grease in this large lye vat, all at one time



Each machinery group is located so as to be as near the place of assembly and disassembly as possible. Groups 7 and 8, for example, are alongside the entering bay where the locomotives are stripped. Group 14 and the pipe shop are on the other side of this bay, and on the second floor overlooking this section is Group 25. Tracks from this bay extend directly into the wheel shop, which in turn is immediately adjacent to Group 2. The main machinery bay is on the other side of the transverse locomotive pits.

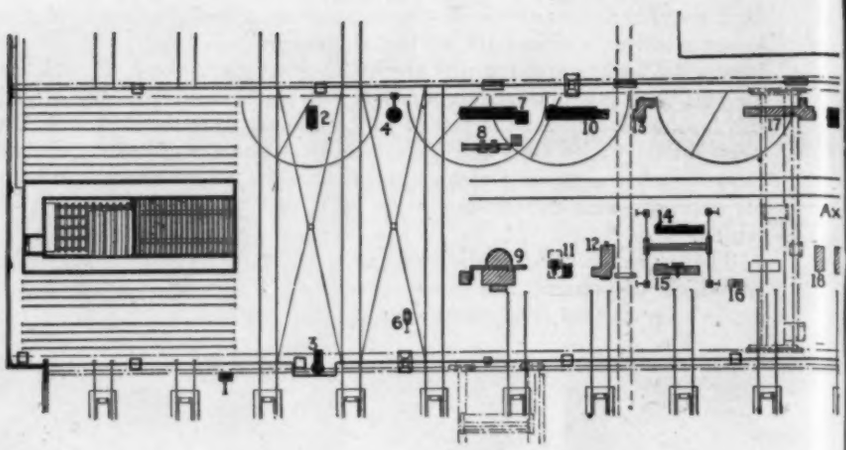
After the locomotives are lifted off the wheels by the 250-ton crane, the wheels are rolled into the adjoining sections where the cellar bolts and cellars are removed and the driving boxes dropped into crates for washing in a large lye vat, also used for cleaning wheel sets, stokers, tender trucks, feedwater pumps, and the like. Sufficient capacity is provided to treat a complete set of wheels at a

(CONTINUED ON PAGE 313)

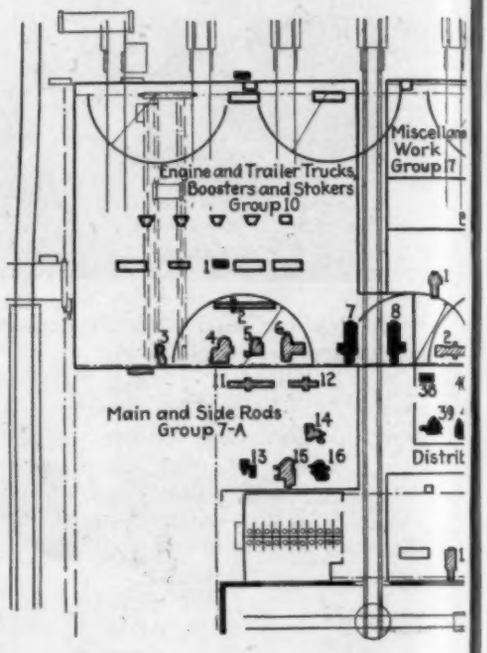
A battery of four radial drills at work in the boiler shop. Shifting of the work is facilitated by 1-ton electric hoists suspended from the jib cranes at each column

EQUIPMENT ANALYSIS

Note: Groups and numbers of listed machines correspond with groups and numbers on drawings. New machines are shown in solid black.



ABOVE
Wheel bay with groups 1, 2, and 11



RIGHT
Main machinery bay—Groups 3, 4, 5, 6, 7-A, 9, 10, 15, 16, 17, 18, 19-A, 20, and 21

Axle, Crank Pin and Wheel Work, Group 1

1. Hisey-Wolf Double End Grinder.
2. Swift Elec. Tire Heater.
3. Hyde 12 in. Elec. Gypsy.
4. Stewart No. 8 Soft Metal Melting Furnace.
5. Spencer No. 1502 Turbo Compressor.
6. Westinghouse 200 Amp. Port. Elec. Arc Welder.
7. Betts 30 in. Axle Lathe.
8. Niles 28 ft. 2-carriage Axle Lathe.
9. Betts 96 in. Boring Mill.
10. Newton Locomotive Milling Mach.
11. Morton 24 in. Key Seater.
12. Niles 72 in. Radial Drill.
13. Steptoe 24 in. Shaper.
14. Betts 26 in. Geared Head Lathe.
15. Lodge & Shipley 24 in. Eng. Lathe.
16. Safety Double End Grinders.
17. Niles 96 in. 600 Ton Wheeled Press.
18. General Electric Motor Generator Set.
19. Niles 84 in. Driving Wheel Lathe.
20. Putnam Journal Turning Machine.
21. Niles 90 in. Wheel Quartering Mach.
22. Sellers 90 in. Driving Wheel Lathe.
23. Niles 90 in. Driving Wheel Journal Turning Lathe.
24. Westinghouse 200 Amp. Portable Elec. Art Welder.
25. Sellers 90 in. Driving Wheel Lathe.
26. Hisey-Wolf Grinder.

Driving Box and Cellar Works, Group 2

1. Worthington 14-in. x 9 in. x 12 in. Piston Pump.
2. Watson-Stillman 100 Ton Hyd. Press.
3. Colburn 42 in. Vert. Boring Mill.
4. Sellers Planer.
5. American 6 ft. Drill Press.
6. Sellers 54 in. Boring and Facing Mill.
7. Sellers 54 in. Boring and Facing Mill.
8. Baker Bros. 30 in. Slotter.
9. Morton 38 in. Draw Shaper.
10. American 6 ft. Plain Drill Press.
11. Morton 32 in. Draw Cut Shaper.
12. Morton 32 in. Draw Cut Shaper.
13. Morton 30 in. Draw Cut Shaper.
14. Morton 36 in. Draw Cut Shaper.
15. Chambersburg Forcing Press.
16. Newton L-66 Driving Box Miller.
17. American 6 ft. Drill Press.

Shoes and Wedges, Group 3

1. Newton Special Shoe and Wedge Milling Mach.
2. Niles 44 in. x 44 in. x 14 ft. Planer.
3. Edlund 3D Drilling Mach.
4. Newton 32 in. Crank Planer.
5. Hisey-Wolf Grinder.

Frames, Pilot Beams, and Draw Castings, Group 4

1. Niles-Bement-Pond 18 in. Slotter.
2. Lodge & Shipley 24 in. Eng. Lathe.
3. Gray 48 in. x 48 in. x 18 ft. Openside Planer.
4. Ohio 5 T Horiz. Boring Mach.
5. Niles-Bement-Pond 42 x 14 ft. Planer

Cylinders and Heads, Steam Chests and Valves, Group 5

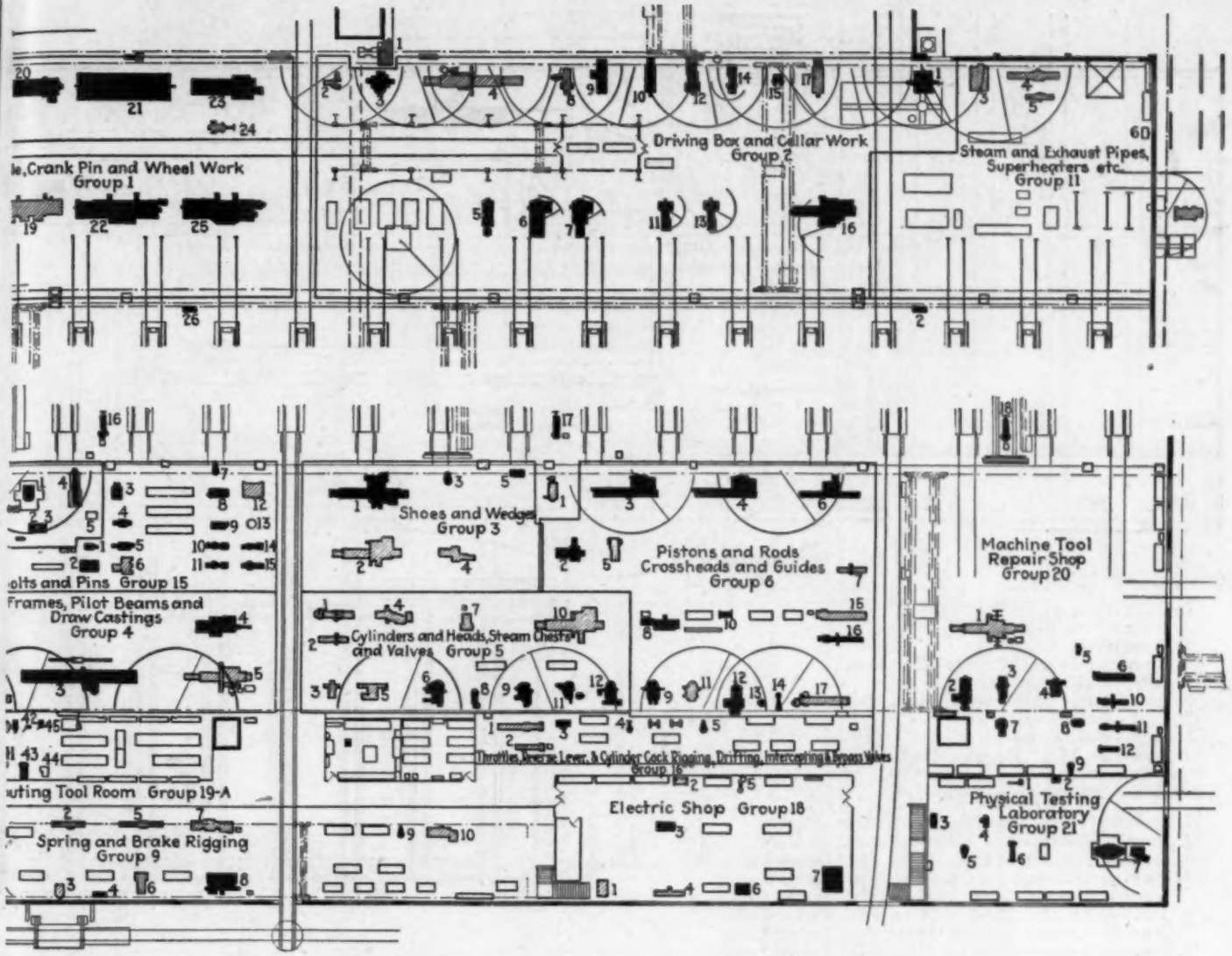
1. Lodge & Shipley 27 in. Eng. Lathe.
2. Schumacher, Boye & Emmes, 18 in. Eng. Lathe.
3. Le Blond No. 3, Plain & Univ. Milling Mach.
4. Newton 32 in. Planer.
5. Cincinnati No. 4 Plain Mill. Mach.
6. Bullard 54 in. Turret Lathe.
7. Bement-Niles 15 in. Slotting Mach.
8. Barnes No. 3—34 in. Drill, Morse Silent Chain Drive.
9. Bullard 36 in. Ver. Turret Lathe.
10. Niles 48 in. x 48 in. x 14 ft. Planer.
11. Niles 42 in. Ver. Turret Lathe.
12. Niles 42 in. Ver. Turret Lathe.

Pistons and Rods, Crossheads and Guides, Group 6

1. Cincinnati 32 in. Back Geared Shaper.
2. Newton 32 in. x 32 in. x 40 in. Crank Planer.
3. Diamond 30 in. Face Grinder.
4. Diamond 30 in. Face Grinder.
5. Baker 18 in. Drill Press.
6. Landis 16 in. x 40 in. x 120 in. Grinder.
7. Reed 20 in. Eng. Lathe.
8. Niles No. 3 Double Cotter Drill.
9. Colburn 42 in. Ver. Boring & Turning Mill.
10. Hisey-Wolf Grinder.
11. Bullard 36 in. Boring Mill.
12. American 4 ft. Plain Radial Drill.
13. Berwick No. 3 Heater.
14. Hanna 12 in. x 12 in. Riveter.
15. Bullard 34 in. Lathe.
16. American 20 in. x 14 ft. Lathe.
17. Chambersburg 400 Ton Wheel Press.

Main and Side Rods, Group 7

1. Ingersoll 54 in. x 16 in. Milling Mach.
2. Newton 48 in. Type "L" Rod Milling Mach.
3. Niles-Bement-Pond No. 10 Vert. Miller.
4. Sellers 84 in. Rad. Drill Press.
5. Newton 54 in. Single Spindle Vert. Rod Milling Mach.


Driving Box and Cellar Work Group 2
Steam and Exhaust Pipes, Superheaters etc. Group 11
Shoes and Wedges Group 3
Pistons and Rods Crossheads and Guides Group 6
Machine Tool Repair Shop Group 20
Cylinders and Heads, Steam Chests and Valves Group 5
Electric Shop Group 18
Physical Testing Laboratory Group 21
Spring and Brake Rigging Group 9

6. Newton S-27 Duplex Rod Boring Mach.
7. Micro F. G. 18 in. Grinder.
8. Hisey-Wolf Grinder.
9. Watson-Stillman 100 Ton Hydraulic Press.
10. Edlund 3D Round Column Type Drill Mach.
11. Lodge & Shipley, 18-in. Engine Lathe.
12. Lodge & Shipley, 18-in. Engine Lathe.
13. Morton 18 in. Keyseater.
14. Gould & Eberhardt, 20 in. Shaper.
15. Bullard, 36 in. Vertical Turret Lathe.
16. Bullard, 24 in. Vertical Turret Lathe.

Valve Motion and Reverse Gears, Group 8

1. Whiting Portable Locomotive Spotter.
2. Newton K-22 Radius Link Grinder.
3. Monarch 18 in. x 18 ft. Helical Geared Headstock Lathe.
4. Monarch 182 x 8 ft. Lathe.
5. Hisey-Wolf Grinder.
6. Edlund No. 3B-24 in. Drill Press.
7. Boye & Emmes 18 in. Eng. Lathe.
8. Ohio 4-T Horiz. Boring, Drilling & Milling Mach.
9. Landis 6 in. x 18 in. Plain Grinding Mach.
10. Landis 6 in x 18 in. Plain Grinding Mach.
11. Newton 32 in. Crank Planer.
12. Heald No. 72A Internal Grinding Mach.
13. Gould & Eberhardt 20 in. Shaper.
14. Kempsmith No. 5 Plain Milling Mach.
15. Baker 18 in. Drill Press.
16. Bullard 36 in. Vertical Boring Mill.
17. Bement-Niles 15 in. Slotting Mach.

Spring and Brake Rigging, Group 9

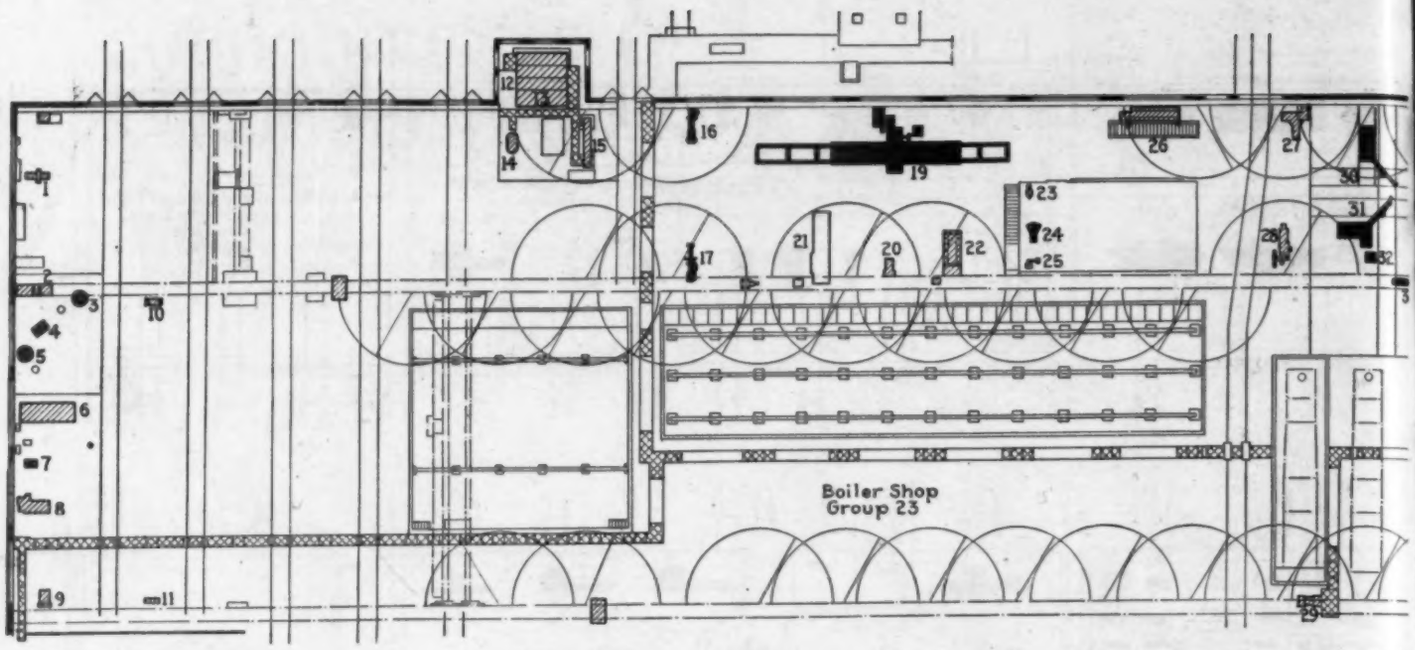
1. Foote-Burt 36 in. Drill.
2. Reed 20 in. Eng. Lathe.
3. Champion 20 in. Drill.
4. Hisey-Wolf Dry Grinder.
5. Lodge & Shipley 18 in. Eng. Lathe.
6. Baker 18 in. Drill Press.
7. Lodge & Shipley 30 in. Eng. Lathe.
8. Colburn Special 3-Spindle Drill Press.
9. Edlund 3D Round Column Drilling Mach.
10. Gisholt 3½ in. x 36 in. Tur. Lathe.

Engine and Trailer Trucks, Boosters and Stokers, Group 10

1. Hisey-Wolf D. E. Grinder.
2. Lodge & Shipley 22 in. Engine Lathe.
3. Champion, 20 in. Upright Drill.
4. Bullard, 42-in. Vertical Turret Lathe.
5. Gould & Eberhardt, 24-in. Shaper.
6. 5-ft. Radial Drill.
7. American 6-ft. Radial Drill.
8. American 6-ft. Radial Drill.

Steam and Exhaust Pipes, Superheaters, Etc., Group 11

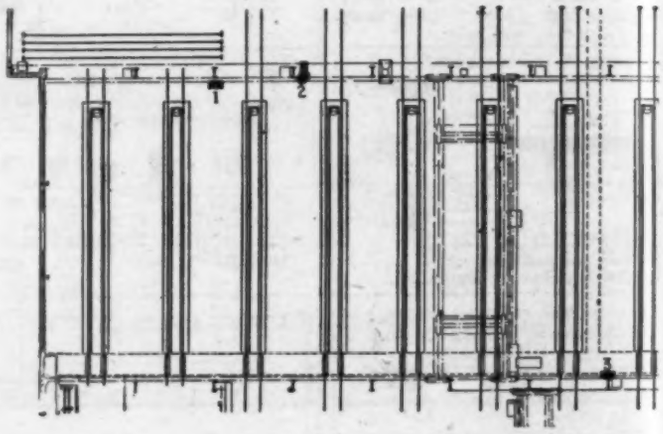
1. Detroit Standard Type "A" Elec. Furnace.
2. Hisey-Wolf Grinder.
3. Niles 60 in. Drill Press.
4. Pond 32 in. Eng. Lathe.
5. Reed 18 in. Eng. Lathe.
6. Hisey-Wolf Grinder.



Boiler Shop
Group 23

PITS, GROUP 12

1. Hisey-Wolf Grinder.
2. Hyde 15 in. Elec. Gypsy.
3. Hisey-Wolf Grinder.
4. American 16 in. Portable Eng. Lathe.
5. Hisey-Wolf Grinder.
6. American 16 in. Portable Eng. Lathe.
7. Bridgeport Grinder.
8. Hisey-Wolf Grinder.
9. American 16 in. Portable Eng. Lathe.



Pits
Group 12

TURRET LATHE WORK, GROUP 13

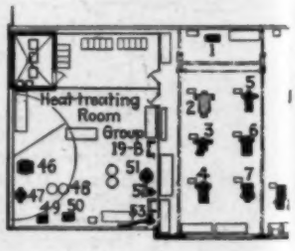
1. Cleveland 1¼ in. Full Automatic Stud Mach.
2. Brown &Sharpe No. 2 Automatic Screw Mach.
3. Jones & Lamson 2½ in. x 24 in. Flat Turret Lathe.
4. Jones & Lamson 2½ in. x 24 in. Flat Turret Lathe.
5. Jones & Lamson 2½ in. x 24 in. Flat Turret Lathe.
6. Jones & Lamson 2½ in. x 24 in. Flat Turret Lathe.
7. Jones & Lamson 2½ in. x 24 in. Flat Turret Lathe.
8. Jones & Lamson 2½ in. x 24 in. Flat Turret Lathe.
9. Warner & Swasey No. 4 Turret Lathe.
10. Warner & Swasey No. 2-A Univ. Turret Lathe.
11. Warner & Swasey No. 2-A Univ. Turret Lathe.
12. Warner & Swasey No. 4-A Univ. Turret Lathe.
13. Warner & Swasey No. 1-A Univ. Turret Lathe.
14. Warner & Swasey No. 1-A Univ. Turret Lathe.
15. Warner & Swasey No. 3-A Univ. Turret Lathe.
16. Warner & Swasey No. 3-A Univ. Turret Lathe.
17. Warner & Swasey No. 4-A Univ. Turret Lathe.
18. Gisholt 6½ in. x 42 in. Turret Lathe.
19. Hisey-Wolf Grinder.

AIR AND BOILER FEED PUMPS, PNEUMATIC DEVICES, GROUP 14

1. Micro Model FG 18 in. Grinder.
2. Micro Model FG 18 in. Grinder.
3. Micro Model FG 18 in. Grinder.
4. Edlund 3D Type Drill Mach.
5. Landis 16 in. x 72 in. Cyl. Grinder.
6. Hisey-Wolf Grinder.
7. Avey 12 Spindle Drill.
8. American 20 in. x 8 ft. Lathe.
9. American 14 in. x 8 ft. Lathe.
10. Bridgeport 16 in. x 3 in. Grinder.
11. Champion 20 in. Upright Drill.
12. Covel-Hanchett No. 800 Vertical Grinder.
13. Rockwell 21 in. Drill Press.
14. Edlund 3D Type Drilling Machine.
15. Hisey-Wolf 18 in. x 2½ in. Grinder.
16. Foster Rotary Lap Plate Truing Machine.

BOLTS AND PINS, GROUP 15

1. Pawtucket No. 1 Nut Facer.
2. Landis 2 in. Bolt Threader.
3. Pels Barshear, Type FV-21.
4. Acme 2 in. Bolt Pointer.
5. Acme 1½ in. Bolt Pointer.
6. Detrick & Harvey No. 4 Bolt Turner.
7. Edlund 3D Round Column Driller.
8. Special 4 Spindle Bolt Turning Mach.
9. Special Bolt Centering Mach.
10. Sidney 14 in. x 6 ft. Engine Lathe.
11. Sidney 14 in. x 6 ft. Engine Lathe.
12. Baush 4-Spindle Bolt Turner.
13. Whiton 3½ in. Bolt Centering Mach.
14. Sidney 14 in. x 6 ft. Eng. Lathe.
15. Sidney 14 in. x 6 ft. Eng. Lathe.
16. American 16 in. Portable Eng. Lathe.
17. American 16 in. Portable Eng. Lathe.
18. American 16 in. Portable Eng. Lathe.



THROTTLES, REVERSE LEVER AND CYLINDER COCK RIGGING, DRIFTING, INTERCEPTING AND BY-PASS VALVES, GROUP 16

1. Hendey 24 in. Eng. Lathe.
2. Reed 18 in. Eng. Lathe.
3. Hisey-Wolf Grinder.
4. Buffalo 20 in. Drill.
5. Edlund 3D Drilling Mach.

MISCELLANEOUS WORK, GROUP 17

1. Bement-Niles Steam Hammer.
2. Johnston 36 in. x 36 in. Blacksmith Forge.
3. Johnston 36 in. x 36 in. Blacksmith Forge.
4. Walter Stock Adj. Machine.
5. Watson-Stillman Vertical Pump.
6. Racine No. 20 Hacksaw.

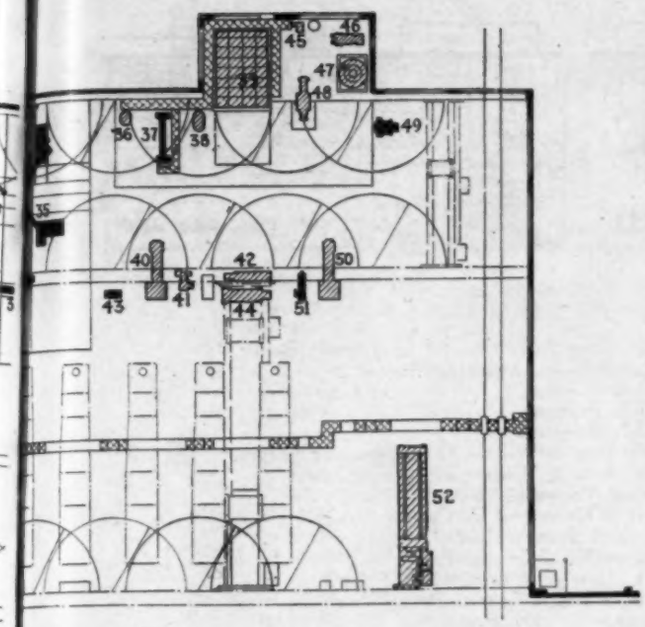
7. Betts-Bridgeford 30 in. Geared Head Eng. Lathe.
8. Bridgeport Safety Emery Wheel Co's No. 5 Tool Grinder.
9. Hisey-Wolf Grinder.
10. Edlund 3D Drilling Mach.
11. American 18 in. Lathe.
12. American 14 in. Eng. Lathe.
13. Whiton 6 in. Centering Mach.

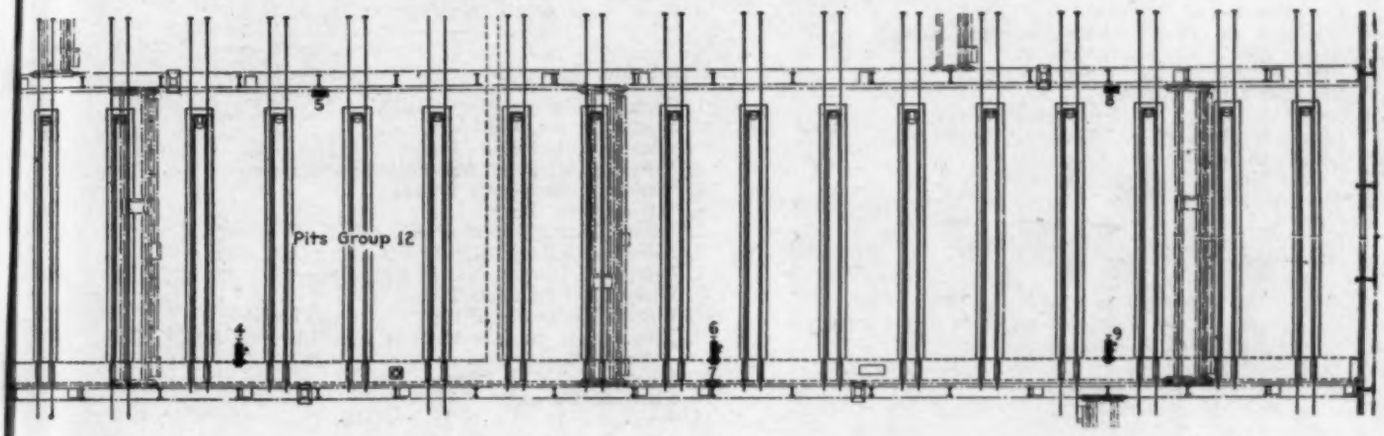
ELECTRIC SHOP, GROUP 18

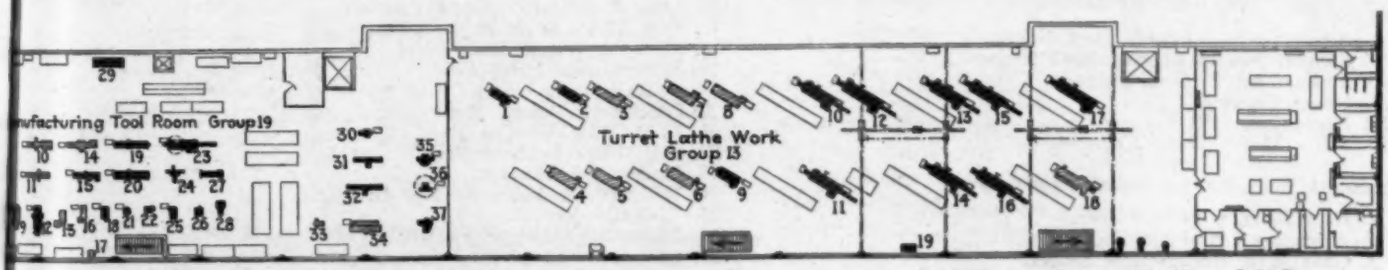
1. Landis 2 in. Double Pipe Threading Mach.
2. Bridgeport 16 in. x 3 in. Grinder.
3. Underwood 3 in. Pneumatic Pipe Bender.
4. Hendey 18 in. Eng. Lathe.
5. Barnes 20 in. Drill Press.
6. Electric Service 40 in. Insulation Shears.
7. Electric Armature Baking Oven.

MANUFACTURING TOOL ROOM, GROUP 19

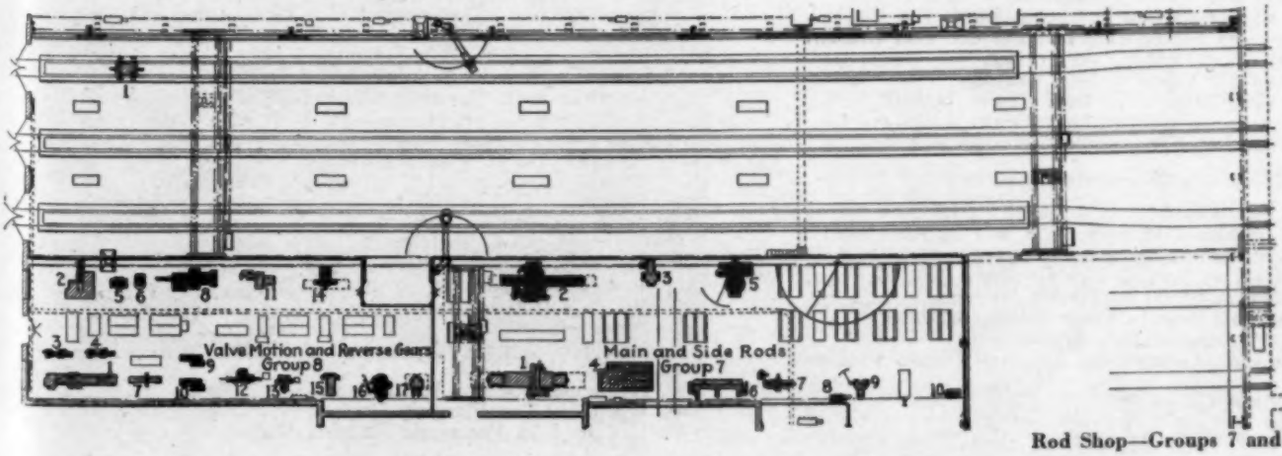
1. Hisey-Wolf Grinder.
2. Brown & Sharpe No. 4-A Univ. Milling Mach.
3. Van Norman No. 3 Milling Mach.
4. Brown & Sharpe No. 2 Milling Mach.
5. Brown & Sharpe No. 3-B Milling Mach.
6. Brown & Sharpe No. 2-A Milling Mach.
7. Pratt & Whitney 6 in. Vert. Shaper.
8. Colburn D-4 Drill Press.
9. Gould & Eberhardt 24 in. Shaper.
10. Lodge & Shipley 18 in. Tool Room Lathe.



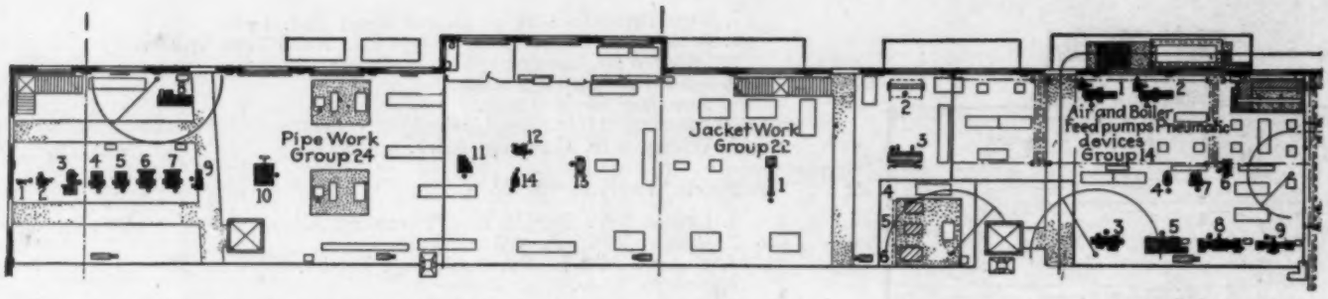




Tool Room—Groups 13, 19, and 19-B



Rod Shop—Groups 7 and 8



Tin and Brass Shop—Groups 14, 22, and 24

11. Lodge & Shipley 18 in. Eng. Lathe.
12. Ohio 20 in. Shaper.
13. Gould & Eberhardt 14 in. Shaper.
14. Hendey 16 in. Eng. Lathe.
15. Hendey 16 in. Tool Room Lathe.
16. Champion 20 in. Drill.
17. Hisey-Wolf No. 3 L. A. Grinder.
18. Barnes 20 in. Column Drill.
19. Pratt & Whitney 16 in. Lathe.
21. Gibbs "Little" Drill Press.
22. Davis No. 1 Keyseater.
23. Warner & Swasey No. 1A Turret Lathe.
24. Jones No. 4½ Arbor & Straightening Press.
25. Pratt & Whitney 5 in. Milling Mach.
26. Campbell No. 2 Nibbling Mach.
27. Whiton 6 in. Two Spindle Centering Mach.
28. Racine No. 20 CX Shear Cut Saw.
29. Pratt & Whitney No. 3 Bench Lathe.
30. Ingersoll Cutter Grinder.
31. Brown & Sharpe No. 2 Grinding Mach.
32. Brown & Sharpe No. 3 Grinding Mach.
33. Landis Die Grinder.
34. Landis No. 4 Univ. Grinder.
35. Abrasive No. 33 Vertical Surface Grinding Mach.
36. Cincinnati 1½ in. Plain Grinder.
37. Brown & Sharpe No. 13 Tool Grinder.
38. Hisey-Wolf Dry Grinder.
39. Sellers No. 1-A Tool Grinding Mach.
40. Sellers No. 2-A Drill Grinders.
41. Sellers No. 1 Univ. Tool Grinding & Shaping Mach.
42. Sellers 3 in. Drill Pointing Mach.
43. Bridgeport Safety Emery Wheel No. 5F Grinder.
44. Gisholt Univ. Tool Grinder.
45. Hisey-Wolf Bench Grinder.
46. Stewart No. 11 Oven Furnace.
47. Stewart Furnace.
48. Stewart No. 3 Double Deck Furnace.
49. Stewart No. 17 Rectangular Furnace.
50. Stewart No. 28 Oven Furnace.
51. Homo Furnace.
52. Hump No. 9158 Furnace.
53. 3-Hp. Motor Turbo Compressor.

Machine Tool Repair Shop, Group 20

1. Betts 54 in. x 14 in. Planer.
2. American 5 ft. Plain Radial Drill.
3. Ohio 24 in. Dreadnaught Shaper.
4. Brown & Sharpe No. 4-A Univ. Mil. Mach.
5. Racine No. 2 Power Hacksaw.
6. Betts-Bridgeford 30 in. Engine Lathe.
7. Bridgeport Safety Emery Wheel Co. Tool Grinder.
8. Hisey-Wolf Double End Grinder.
9. Edlund 3D Round Column Grinder.
10. American 18 in. High Duty Engine Lathe.
11. American 14 in. High Duty Engine Lathe.
12. Whiton 6 in. Two-spindle Centering Machine.

Physical Testing Laboratory, Group 21

1. Southwark 5½ in. x 1½ in. pump.
2. Ingersoll-Rand 15 in. x 3½ in. x 4 in. Air-Cooled Compressor.
3. Hisey-Wolf Type 7 Dry Grinder.
4. Southwark 60,000 lb. Testing Machine.
5. Edlund 3D Round Column Drilling Machine.
6. Scott Horizontal Fabric Tester.
7. Southwark 1,000,000 lb. Universal Testing Machine.

Jacket Work, Group 22

1. Thomson Spot Welder.
2. Peck, Stow & Wilcox 98 in. Cornice Brake.
3. Niagara 96 in. Squaring Shears.
4. Babbitt Furnace.
5. Babbitt Furnace.
6. Babbitt Furnace.
7. Peck, Stow & Wilcox 32 in. Squaring Shears.
8. Peck, Stow & Wilcox 36 in. Foot Shear.
9. Lennox Throatless Rotary Shear.
10. Dreis & Krump 96 in. Cornice Brake.
11. Thomson Spot Welder.
12. Niagara No. 7 Geared Press.
13. Peck, Stow & Wilcox 42 in. Shear.
14. Niagara No. 4 Geared Press.
15. Niagara No. 101 Press.
16. Peck, Stow & Wilcox 36 in. Shear.

Boiler Shop, Group 23

1. Greenlee Hollow Mortising Mach.
2. Sturtevant No. 4 Blower.
3. Standard Blacksmith Forge.
4. Niles-Bement-Pond 600 lb. Steam Hammer.
5. Standard Blacksmith Forge.
6. Sellers 84 in. Radial Drill.
7. Edlund No. 3-B Drill Press.
8. Niles 5 ft. Radial Drill
9. Detrick & Harvey No. 14 Bolt Cutter.
10. Hisey-Wolf Grinder, Type 7.
11. Bignall Keeler No. 2 Pipe Cutter & Threader.
12. Ferguson 12 ft. 1 in. x 12 ft. 7 in. Flanging & Annealing Furnace.
13. Sturtevant No. 5 Blower.
14. Flanging Forge.
15. Pneumatic 10 ft. x 10 in. Flanging Press.
16. Long & Allstatter No. 4 Punch.
17. Pels Plate, Angle & Bar Shear.
18. Henry & Wright Drill Press.
19. Niles-Bement-Pond Auto. Spacing, Punching & Shearing Mach.
20. Quickwork Rotary Shear.
21. 12 ft. Plate Bending Rolls.
22. 8 ft. Plate Bending Rolls.
23. Modern Die Grinder.
24. Wilmarth & Morman Drill Grinder.
25. Tool Grinder.
26. Foote-Burt Mud Ring Drill.
27. Lennox 5½ in. Circular Shear.
28. Hilles & Jones No. 4 Horiz. Punch.
29. Worthington Piston Pump.
30. American 6 ft. Traversing Radial Drill with Ext. Arm.
31. American 6 ft. Plain Radial Drill with Ext. Arm.
32. Ruthman Gusher Coolant Pump.
33. Lynd-Farquhar 13 ft. Wall Radial Drill.
34. American 6 ft. Traversing Rad. Drill with Ext. Arm.
35. American 6 ft. Traversing Rad. Drill with Ext. Arm.
36. 5 ft. x 4 ft. x 12 in. Deep Flanging Forge.
37. Pneumatic 12 ft. Flanging Clamp.
38. 2 ft. 11 in. x 6 ft. x 12 in. Deep Flanging Forge.
39. Ferguson 12 ft. 9 in. x 18 ft. Flanging & Annealing Furnace.
40. Cleveland Single End Punch.
41. Richmond 12 Spindle Stay Bolt Drilling Mach.
42. Massey 6-Spindle Stay Bolt Threader.
43. Hisey-Wolf Grinder.
44. Edwin Harrington 6 Spindle Threader.
45. 3 ft. 6 in. Buffalo Blower.
46. Duplex Hyd. Pump.
47. Hydraulic 1500 Lb. Accumulator.
48. Wood 150-Ton Flanging Press.
49. McCabe ¾ in. Pneumatic Flanging Mach.

50. Cleveland Single End Punch & Shear.
51. Gisholt Horiz. Threading Mach.
52. Hilles & Jones 24 ft. Power Bending Rolls.

PIPE WORK, GROUP 24

1. Peter's 12 in. Pipe Cutter.
2. Murchey 4 in. Pipe Cutter.
3. Bignall & Keeler No. 3 Pipe Cutter.
4. Landis 1¼ in. Double Head Pipe Threading Mach.
5. Landis 1¼ in. Double Head Pipe Threading Mach.
6. Landis 2 in. Double Head Pipe Threading Mach.
7. Landis 2 in. Double Head Pipe and Nipple Threading Mach.
8. Landis 8 in. Single Head Pipe Threading & Cutting Mach.
9. Williams 4 in. Single Head Pipe Threading Mach.
10. 3 in. Ex. Hy Rotary Pipe Bending Mach.
11. Pels Punch & Shear.
12. Atkins 12 in. x 14 in. Metal Band Saw.
13. Hisey-Wolf Grinder.
14. Rockwell 21 in. Drill Press.

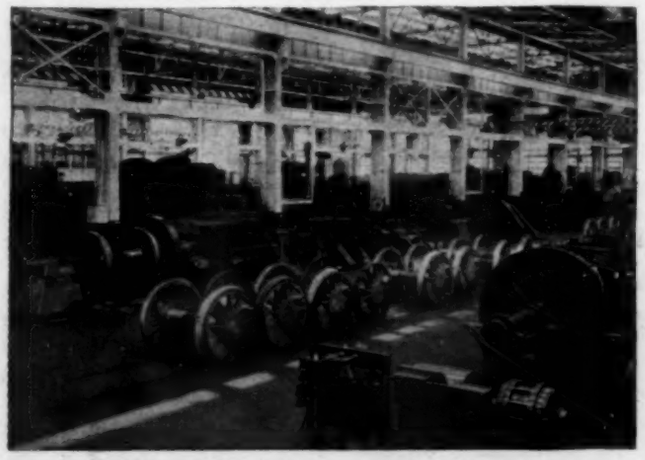
BRASS WORK, GROUP 25

1. Lodge & Shipley 18 in. Engine Lathe.
2. Lodge & Shipley 18 in. Engine Lathe.
3. Lodge & Shipley 20 in. Engine Lathe.
4. American 24 in. Fox Lathe.
5. American 24 in. Fox Lathe.
6. American 18 in. Fox Lathe.
7. American 18 in. Fox Lathe.
8. Sidney 18 in. Monotrol Engine Lathe.
9. Sidney 18 in. Monotrol Engine Lathe.
10. Warner & Swasey No. 4 Turret Lathe.
11. Gisholt 3¼ in. Turret Lathe.
12. Brown & Sharpe No. 6 Automatic Screw Machine.

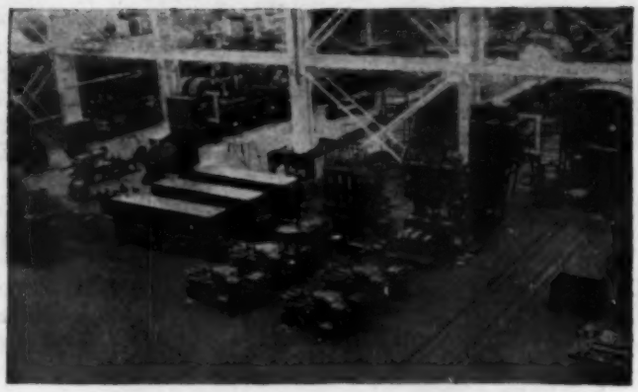
(CONTINUED FROM PAGE 307)

time. Upon removal from the vat the components are hosed down with clean water to remove all traces of the solution. Tires, axles, and crankpins are then given a close inspection. If the tires must be removed the work is done at this point, at the head of the wheel bay, with the aid of the conventional gas-fired ring. The wheel centers are then checked for counterbalance and out of round.

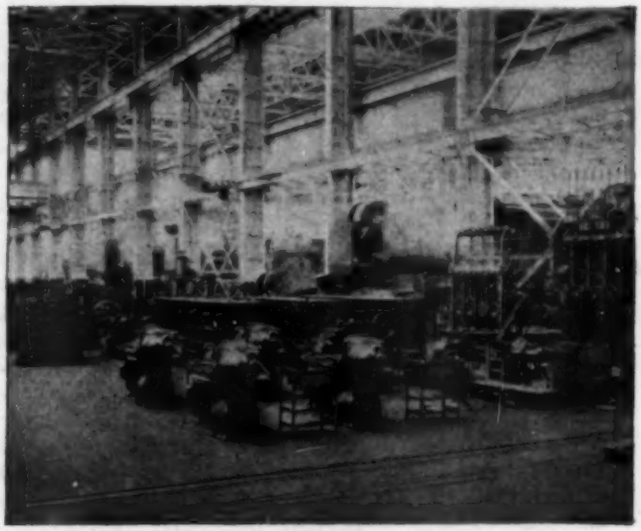
The wheel shop is laid out on both sides of a wide aisle and leads down to the driving box section where reconditioned boxes meet finished wheels. Included in the equipment are four wheel lathes, one with quartering attachment, a quartering machine, a modified wheel lathe with two welding heads attached for building up wheel centers, two driving axle lathes, a special quartering keyway cutter for driving axles, a 26-in. shaper, two 24-in. lathes, a keyway slotter, a 5-ft. radial, and a 600-ton hydraulic press. The machines are grouped in parallel rows on either side of a set of tracks running the length of the bay. Two 15-ton bridge cranes serve this section.



A section of the wheel shop. On the far side two wheel lathes and a quartering machine can be seen; in the right foreground is a wheel-center welding unit



Neat grouping of bolt manufacturing equipment. In the background are two batteries of bolt skimmers with four engine lathes and a centering machine in the foreground. To the left of the storage racks is the threading equipment, together with a bolt shearer



A close-up view of the bolt manufacturing equipment seen in the illustration above

Adjoining the wheel shop is the driving box group, described in detail in another article.

Several divisions are found in the heavy machinery bay on the other side of the locomotive pit section. At the far end is the machinery repair department where all machine tools for the entire system are rebuilt. While some old equipment has been relegated to this group, by far the greater part of the equipment is new, including a manufacturing-type miller, three lathes of 14-, 18- and 36-in. swing, 24-in. shaper, 5-ft. radial drill, sensitive drill, power hacksaw, centering machine, and floorstand grinders.

A characteristic of this main machinery bay, as well as of other sections of the shop, is wide spacing between machines and wide aisles between the four rows of machine tools. The central aisle is wide enough to permit driving a truck down it. As the photograph of this

section shows, an appearance of orderliness and neatness prevails, in contrast to the usual conditions found in a locomotive repair shop. Motorized equipment makes possible this effective arrangement. There are only two belt-driven machines in the shop. New equipment was purchased with motor drive; existing equipment was changed over to V-belt drive in most instances.

In the piston and rod groups the machinery is laid out so that the work goes from machine to machine progressively without much backtracking. Hence we find a miscellaneous group of equipment in each section, rather than machines segregated by class; for example, the arrangement in this department is as follows:

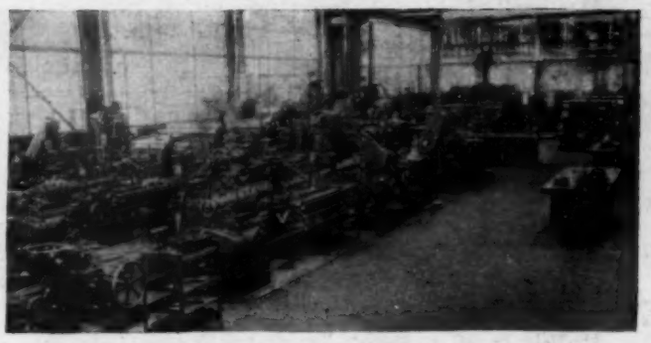
1—Hydraulic press
2—20-in. engine lathes
1—Pneumatic riveter
1—Electric rivet heater
1—4-ft. radial drill
2—Vertical boring mills
1—Tool grinder
1—Drill press
1—Cylindrical grinder
2—Face grinders
1—Crank planer
1—Shaper
1—Duplex keyway miller
1—34-in. lathe

The riveter is used for attaching bull rings to piston centers. The keyway miller is a modern piece of equipment and is for cutting keyways in crossheads and piston rods. Two heads are employed with cutters operating on both sides of the rod at once.

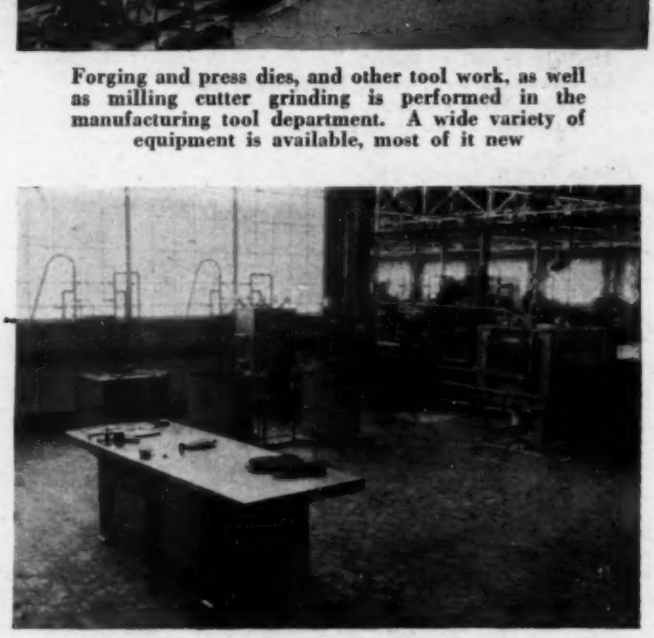
Opposite this section is the shoe and wedge group in which some work is also done on crosshead guides. For this latter there are two heavy-duty grinders. Several planers are available for refinishing crosshead slippers, but the bulk of the roughing work on new castings is performed on a planer miller with gang cutters, an indexing table, pneumatically clamped, and semi-automatic cycle control. With two shoes being milled simultaneously, the time per piece is nine minutes as against 30 minutes on the planer. This operation is illustrated.

For frames, pilot beams, deck, and other heavy castings, several heavy-duty machine tools are available, including a 44-in. x 18-ft. open-side planer, a horizontal boring mill, and a 6-ft. radial, all new. Another new 6-ft. radial is used in the stoker section adjacent.

Manufacturing work for the entire division is done in this screw machine department, which has two screw machines, sixteen turret lathes, two sensitive drills, and an oil groover



Forging and press dies, and other tool work, as well as milling cutter grinding is performed in the manufacturing tool department. A wide variety of equipment is available, most of it new



Besides the gas-fired muffle furnaces and the salt bath, there are two electric furnaces, one for hardening, the other for drawing, a vertical gas-fired muffle type for long tools, and a sandblast machine

An unusually neat arrangement is found in the bolt department, segregated in a section of the heavy machinery bay. As the illustration shows, four manufacturing lathes, a centering machine, and two sets of bolt skinners are separated from the threading by racks in which finished bolts are stored and classified as to length and diameter. This stock is drawn upon as needed so that manufacturing is for parts stock, rather than for individual orders. This section is adjacent to the locomotive pits so that little handling is necessary. Three portable lathes are also available for bolt fitting at the pits.

Rod work, as has been indicated, is done alongside the entering stripping tracks to avoid long hauls of these heavy parts. One end of this section is devoted to bushing work and includes two 18-in. engine lathes, a 20-in. shaper, a keyseater, an internal grinder, and two vertical turret lathes. One of these last named is fitted with a tungsten-carbide tool for burnishing and work-hardening the wearing surface of brass bushings.

All rods for the entire road are manufactured in this section which is located next to the forge shop where the rods are roughed out from the billet. For the machining operations there are available two vertical millers for profile work; two planer-type millers, one for channelling, the other for slab work; a duplex head drill for cutting out side rods in progressive drilling and boring operations; and a radial drill.

In the same bay, valve motion links and bushings are reconditioned. An innovation in this section is the intro-

duction of two manufacturing types of automatic-sizing grinders, and internal and external machine, for finishing steel bushings and pins, varying in size from the nominal figures. Four sizes are available in each range.

On the other side of the stripping track is the pipe and nipple department, consisting largely of threading equipment. In the same bay the sheet-metal shop is located, and on a second floor above this section is the tin shop where light sheet-metal work for the entire system is carried on. Brass work is also done on this floor, including the reconditioning of all cab and boiler valves and fittings, as well as air brake apparatus except the compressors, which are reground and put in condition on the floor below. For brass operations, a group of nine engine lathes, two turret lathes, one automatic screw machine, a sensitive drill, and a floor stand grinder are available.

When the locomotives are stripped, all valves and fittings are thrown into tote boxes and trucked to an elevator by which they reach the brass shop. After repairs are completed and the valves and gages tested, they are placed in designated compartments in a second set of tote boxes which thus act as a receiving station. Both sets of tote boxes bear the engine number for identification.

Almost all the equipment in the air pump shop department is new, including three internal grinders, an external cylindrical grinder for piston rods, two engine lathes, and a sensitive drill.

All valves and fittings as they are taken off the locomotive are placed in tote boxes (left) and trucked to this mezzanine

Drifting valves and other special valves, as well as reverse and throttle levers are repaired in a bay adjacent to the heavy machinery section and under the mezzanine floor upon which the locker and washrooms are located. Springs and brake rigging are also repaired in the same section. Further along is the electric shop, separated from other departments by wire netting. Locomotive and car lighting generators repairs, as well as maintenance on shop electrical equipment, are done here.

On a second floor in this same bay is a completely equipped chemical laboratory, turret lathe department, and manufacturing toolroom. In the turret department are two screw machines and sixteen turret lathes arranged at an angle on either side of a wide aisle, plainly seen in the illustration. There is also a sensitive drill and an oil groover at the far end. This department manufactures stock parts from bar stock for the entire system and is a model of neatness and efficiency.

The manufacturing tool department sharpens all inserted-tooth milling cutters, repairs air motors and air hammers, and makes forging and press dies. Almost all of the equipment in this shop is new and is segregated by type of machine. In this section are five millers, a vertical shaper, two heavy-duty drills, a sensitive drill, three shapers, six precision engine lathes, a turret lathe, and miscellaneous equipment, such as a nibbler, power hack saw, hand miller, arbor press, centering machine, and keyway cutters. In the grinding section are three cylindrical grinders, a surface grinder, two tool grinders, a reamer grinder, and a milling cutter radius grinder.

A completely equipped tool hardening room is also available. It contains four muffle furnaces and a salt bath, each operating on natural gas with automatic temperture control, and two electric furnaces, a Homo and a Hump type, one for tempering, the other for hardening. Oil and water quench tanks are provided for each group of furnaces, and a sandblast machine is available for cleaning purposes.

The manufacturing tool shop communicates with the machine shop toolroom on the ground floor by a dumbwaiter. A separate toolroom located on the other side of the main building serves the boiler shop.

The boiler shop was erected in 1926, but at that time was completely modernized so that today it compares well with similar installations in the other shops. While the forge shop is still housed in its original buildings, new equipment has been added from time to time so that it can effectively handle the work in hand. In this section is a gas-fired furnace used to anneal all binders, brake and spring rigging. It measures 5x15 ft. and has two cars handled in and out by gasoline tractors, the work being allowed to cool in the furnace.

The shops were constructed by the United Engineers & Constructors, Inc., New York, and when running full, will employ 1,942 men, 64 of them being supervisors. In buildings and arrangement this is probably the last word in railroad shops in this country, and the Chesapeake & Ohio Company is to be congratulated for its broad vision and courage in investing upwards of three million dollars in this plant.

EXECUTIVE FORUM

Square Deal or New Deal?

"HERBERT JENNINGS of the Express Machine Company to see you," announced Bill Holland's secretary.

It was a sultry summer's afternoon, and Holland had intended to leave his office early. However, Jennings was an old friend, and in response to Holland's "show him right in," he appeared a few moments later.

"I know both Bert Jennings and the Express Machine Company of old," said Bill shaking hands with his visitor, "but I never linked them together before."

"Read the papers and keep up to date, Bill," said Jennings smiling. "I've been works manager at the Express over two weeks now. This time I've brought you a real problem."

"Usually the tougher they are, the better I like 'em," said Bill. "What's on your mind?"

"As you know," said Jennings, "when a man goes to a new plant in an executive capacity, there are adjustments to make—personal ones, I mean. I don't say it's as bad as getting married, but still there must be certain compromises before things go smoothly. I've never held with the drastic moves some men make in going to a new concern, but it looks very much as though I'd have to clean house or get crowded out myself."

"I'm surprised at that," said Bill. "I always thought there was very little friction in the Express Machine Company."

"That's true without question," Jennings agreed. "Pop Nolan, the general foreman, worked hand in glove with my predecessor. Apparently they understood each other and made things go. But Nolan evidently felt he was in line for works manager himself and resents my presence. He simply won't co-operate, and many of the foremen are loyal to him. Production is off, and before long, the president will think I'm the one who is out of step. This can't go on."

"Don't move too fast," advised Bill. "The old organization has many assets. It is thorougly familiar with the work, and years of experience entitle the older men to some consideration. Most men have some angle of approach. Nolan may get over his soreness, and if you win him over you will be ahead of the game."

"I started on that theory," said Jennings, "but if I don't get some action soon, I may not be able to make the changes I want. A few weeks more of the present conditions and I'll be discredited as a works manager. That's what Nolan is waiting for."

"As I remember, Nolan's been with the Express Machine Company fourteen years," said Holland. "Will you be backed up if you attempt to remove him?"

"I accepted this position only on condition that I'd have a free hand," said Jennings. "When I started I almost brought my old general foreman with me. I still think I can get him and several more of my old men. A clean sweep right now would give me a loyal organization and one that won't take long to learn the run of this plant. Those of the old crowd that remain will soon fall in line."

"Well you're the final judge," said Bill. "Some men start right in weeding out the old organization, but I always looked on it as a last resort."

Topic suggested by James K. Matter, E. G. Budd Manufacturing Company.

■

What Do You Think About This Executive Problem?

Frequently a new executive will rid himself of a large part of the old organization and replace it with men whom he has previously employed or unknown outsiders. Such a move may eliminate traditional jealousies, suspicions, and lack of co-operation. On the other hand, it may be wasteful of accumulated experience, and entail an element of unfairness.

Wholesale house cleanings are so common in industry that you may have had opportunity to witness their results. What is your reaction to this procedure?

. . . Discussion
of Executive Problems

■

Jigs By Whom?

The product engineering department knows most about the product, how it functions, and how the various parts should fit together. The tool department understands more about jig and tool design. But the production department concerned with the use of the tool must certainly be consulted, as it usually knows most about the practical features of jigs and fixtures. However, while the production department may be able to offer valuable suggestions and make improvements in a design, it may be unable to get the design started.

The responsibility for jig and fixture design should be upon one man, a tool engineer. The tool engineer should consult the product engineer and the head of the production department.

If these men are consulted and their suggestions given consideration, their good-will will be obtained. This is an important consideration, particularly in the case of the head of the production department, who must use the tools. If he has sponsored the designs, he will be more likely to see that the tools are properly used in the shop.

The tool engineer should not only design the fixture but should also provide all special tools and gages that will be required and have them in readiness when production is started. Executive considerations in tool design demand that the tool designer should report directly to the works manager, as he must pass upon the estimated cost of a tool in respect of production expected.

JOHN GODDARD, *Experimental Engineer, Frost & Wood Company, Ltd., Smith Falls, Ontario, Canada.*

Wholesale or Retail?

After many years of buying certain articles through the purchasing department, I believe that the practice has a definite value to the employee, and for the retailer. Most of our articles are bought through him by our purchasing department, so that he is in on the profits of the purchase, but on a reduced scale. I believe many items are purchased through the shop that would not be bought if the buyer had to go out and pay full price. While the retailer may not make as much on each article, he makes up for this through the volume of sales.

I have talked to a number of dealers in various lines, and I have never heard of any dissatisfaction against our method of factory purchasing. I have had some of the merchants ask me to put in a word so that they would receive a greater volume of our shop business. This seems proof that they are satisfied with our method.

—WILLIAM BETZ, *Master Mechanic, The Fafnir Bearing Company.*

Pensions or Leaky Payrolls?

We here in England are not troubled with the question of old age pensions as you are in the United States. Most of our industrial workers, with less than 250 pounds per year, have one quarter taken from their wages which is coupled with a like sum from the employers. At the age of 65 a man can draw ten shillings per week. All this was done with the idea of getting men at this age to retire, making room for younger men who might be out of employment. At the other end, we are thinking of raising the school-leaving age to fifteen years for the same reason.

However, many employers have taken the whole or part of this ten shillings from the wage of these old workers and kept them on at the old job. Ten shillings being so little, the older men who can stay do so, with the result that the relief to unemployment is not very great.

All men who receive more than 250 pounds and are not doing 60 per cent of manual work are debarred from these schemes, and it is for these that some form of provision for old age should be made by the employers and the men themselves. How this can be done is the problem. Personally I favor the state plan as applied to the manual class, but with larger contributions from each party, because men of this class are used to a higher standard of living. If this were done, all employers would start level when fixing costs, for surely the cost of providing pensions can be called costs of production. This state method to my mind is better than any private insurance company. I do hope that we do not get it into our heads that all men should retire when 65. I have older men working under me whom I would rather trust with a job than any of the younger men.

—THOMAS SMITH, *Nottinghamshire, England.*

Should Small Shops Co-Operate?

Birmingham, England, is still to some extent, as it was 100 years ago, a town of small shops. There are shops where one person combines the functions of typist, bookkeeper, storekeeper, lorry driver, foreign correspondent, and wages clerk. Often the individual concerned is either a near relation of the owner or has himself some interest in the business. There are, on the other hand, quite a number of very capable bookkeepers who have a round of customers whom they visit once a week or oftener. They are as well acquainted with the books of each of the shops they work for as would be a full time bookkeeper in any one of them. While not entirely free from objection, the practice is found to be generally satisfactory both to the small shop owner, who gets his work done well at a price much lower than would otherwise be possible, and to the bookkeeper, who earns more than if fully employed in the office of a large firm, although of course, he works longer hours. The bookkeeper may occasionally find himself working for competing firms, but this is purely incidental to his work. The small shop owner is committed to nothing more than providing the little office accommodation necessary—often this consists of surrendering his own desk for a few hours.

To a lesser extent, correspondence is dealt with in the same way though one finds that here more frequently an opportunity is provided for a girl or young married woman who, for domestic reasons, is able to give only

a few hours a day to work in an office. Small firms, having foreign correspondence to deal with, either send it to a bureau or are again regular customers of a free lance foreign correspondence clerk whom they summon by phone when required. —H. J. BURNHAM, *Birmingham, England.*

Does Reciprocity Pay?

It is so easy to marshal an imposing array of reasons, theoretical reasons, why reciprocity is obsolete, why in this day of keen competition, every order should stand on its own feet, that one is tempted to succumb to the lethargy of the season, and fall into step.

Perhaps it is a purchasing agent, who sees only first cost, that counsels the economy of open bid purchase—or yet again, an engineer who has been listening to an enthusiastic sales presentation of new features of a yet untried product. It may be a sales manager, with dreams of fabulous sales of his product, if it weren't certain that his customer had no chance to sell in return, through being barred by the known reciprocity of a competitor. So they parade by, and in their shadow lurks the product that doesn't stand up and whose seller doesn't stand by because he can't at the price—the promised performance that just isn't realized because the conditions are a little special.

Logical reciprocity status, such as that discussed in the presentation, is attained after long years of successful business relations. It is based on facts, not promises. It stands by in lean times as well as good. Just as any business builds itself up not only because of its product, but also because of the men behind it, so reciprocity is the result of the highest ideals of business faith and trustfulness, as expressed by the men who have builded the respective businesses. Every business needs a few good friends among its customers—the old reliables. Reciprocity may be old-fashioned, but it is not obsolete; and it should not be scrapped for a beautiful theory without long and deep consideration.

—CHARLES KLYNE, *Foreman, Russell Machine Company.*

Jigs By Whom?

One factory may have a good production superintendent who is absolutely no good at designing or even approving of the design of jigs; yet this superintendent may be an expert at training workmen, and kept on the job for just that reason. Such a shop should place the designing responsibility entirely with the engineering department unless the plant is large enough to warrant an expert chief tool designer.

Another factory may have a superintendent who is an expert tool man and can make free-hand sketches, a man who can read a drawing quickly and know just how the tool will function. An organization having a superintendent of this type should place the tool designing directly under him and not under the engineering department, assuming, of course, that the nature of the business is such that it is not necessary to consider the tooling when the product is being designed.

Still another factory may have very long runs on its product with practically no changes year after year. Then it is more economical to let the chief engineer have charge of tool designing, even going so far as to have men who have finished the engineering drawings do the tool designing. The few mistakes that the engineering department may make, would not be as expensive as maintaining a more or less temporary tool design force, and hiring a few green men who would have to be let out after production started.

An ideal set-up for factories employing one thousand or more men, is to have the sales, engineering, tool designing, and production departments on an even basis under the works manager, each department having a specialist at its head and being independent of all other departments. In looking for an answer to who shall have charge of the tool design, any works manager will do well to check over all of his department heads, choose the executive having the best qualifications and design experience, and place the tool design department under him. If the factory is large enough to warrant, then a chief tool designer should be hired to report directly to the works manager. —C. F. STAPLES.

Jigs By Whom?

Whether jigs and fixtures should be initiated by the engineering department, or whether the latter should merely make the necessary drawings for their construction under the direction of the shop, is a question which seems to depend on the personal qualifications of the men in charge of the two departments. The design of jigs and fixtures is very distinctly an engineering problem, but one on which the advice of workmen may very well be sought.

After it is decided to make a jig or fixture for any one piece of work, the engineering department should make the drawing. In some instances, it may be well for the design to be accepted and the jig or fixture made as designed, but in many other cases, it would be best to let every one who is likely to have the job, look it over. Even in the case of the very smallest of jigs for drilling simple holes, it is likely that men who are constantly using them will give good suggestions.

—GEORGE S. GOODRICH.

Success or Successor?

The idea that all the brains in an organization should remain concentrated in its chief, is as obsolete as the tandem bicycle. In this day of keen competition, the executive who holds his information close, may find himself standing out like an airway beacon on his own skyline, but the organization will be entirely unequipped to compete with one where everyone thinks for the firm.

Another point which appears to be entirely overlooked is that by passing on all current knowledge to his assistant for use, the general manager is providing himself with time whereby he can develop newer and better ideas. The same inherent qualities which made him general manager originally, should be able to keep him ahead of the field. I have always felt that the man who had so little self-confidence, that he had to continually capitalize his special personal knowledge as his chief asset, would sooner or later lose out.

So, for the man who is sure of himself, I would always advocate passing on his information. As he builds up his assistants, so he will in turn be able continually to strive for higher things himself. When his own opportunity for advancement comes, he will not be held back because he cannot be spared in his present position. —BERNARD F. MCCORMACK.

Driving Box Practice

in the C & O Shops

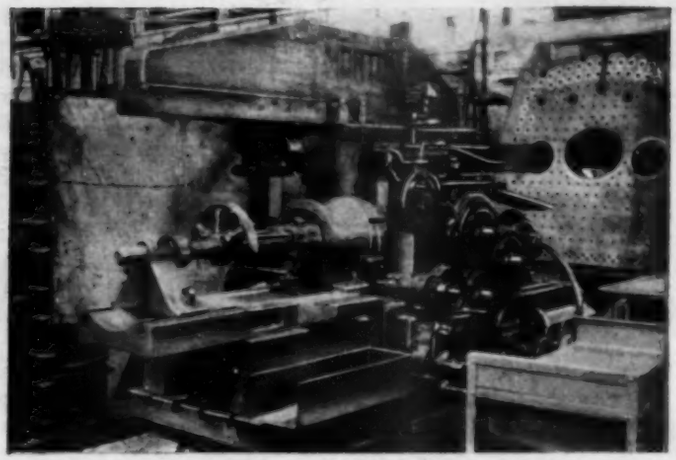


Fig. 1—A rotating fixture has been applied to this draw-cut shaper for finishing the outer surface of new crown brasses

In order to minimize material handling, the equipment has been arranged so that the work moves progressively from machine to machine without backtracking

IN THE new shops of the Chesapeake & Ohio Railway Company at Huntington, W. Va., the wheel shop and the driving box shop are in the same bay, with the flow of work in each toward the middle where finished wheel sets meet reconditioned boxes. The flow of work in the driving box section is roughly in the form of a U with the final assembly of boxes to axles taking place in the central section at the top of the U. Machines and benches are arranged on two sides of a center track in the order of the sequence of operations, and there is a progressive flow of work without backtracking. To accomplish this, it has been necessary to duplicate some of the machinery, even though its use may be fairly infrequent. Most of the equipment used is new and in some instances represents novel applications not ordinarily found in a railroad shop.

First in line is a hydraulic press for removing the old crown brasses from the boxes, which reach this section in a cleaned condition with the cellars already withdrawn. Hub liners are cast in place with an undercut dovetail to secure them, and removal of these liners is done in a 48-inch boring mill by what might be termed a trepanning operation. As soon as the U is freed by the cutting tool, the brass liner can be lifted off. Shoe and wedge liners are held in like manner between V's, and when they are $\frac{3}{4}$ in. below standard, are removed by undercutting along the side in a planer. Three or four boxes are set up at a time.

Truing of the crown brass fit is done in a draw-cut shaper with an arc-forming attachment. Similarly the new crown brass is finished on the outside in a draw-cut shaper having a rotating fixture that is indexed the amount of feed at each stroke. Unlike standard draw-cut shapers, this machine has the head guided the full length of stroke by an overarm support. At this point, instead of hauling the work back to press No. 1 to put in the new crown brass, a second hydraulic press is located next to the last shaper to avoid backtracking of the heavy boxes. Next to the press is a 6-ft. radial drill with its table flush with the floor. With this equipment two holes are drilled and reamed in each crown brass so that it later can be pinned in position with a tapered brass pin. Three or four boxes can be set on the table at a time and drilled, their own weight being sufficient to hold them in position during the operation.

The box is now ready to have new hub liners and shoe and wedge liners cast in place. To save transportation and loss of time in sending the heavy boxes to the brass foundry in a distant part of the shop, an electric brass melting furnace has been provided and is located

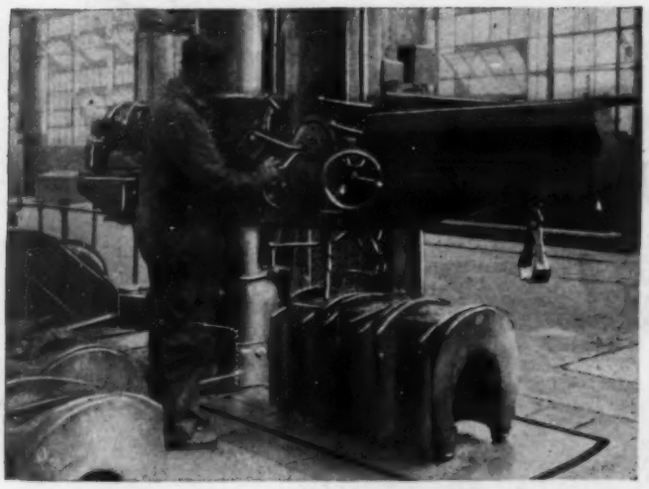


Fig. 2—The universal tool of the railroad shop. This radial is being used to drill holes for pinning the crown brasses in the driving boxes

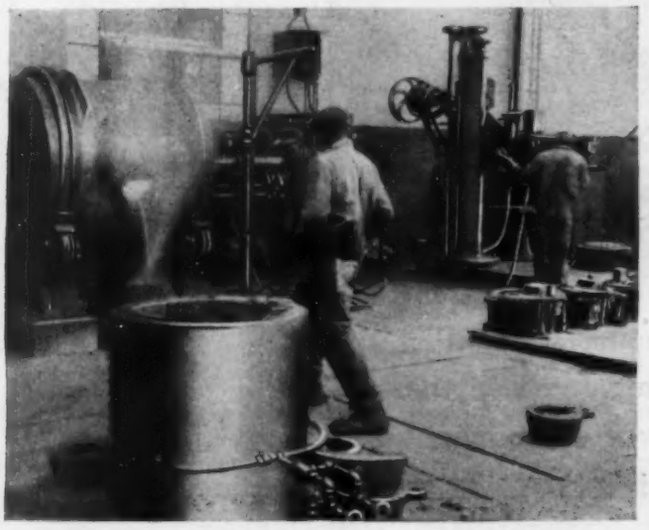


Fig. 3—Immediately adjacent to the machine line is this rotary electric furnace for melting brass for liners. In the foreground is a gas-fired preheating furnace for the ladle

at the end of the machine line, at the bottom of the U mentioned previously. The furnace is cylindrical in shape, with its axis horizontal, and is mounted on trunnion rollers, much like a concrete mixer, so that it can be readily tilted for pouring directly into the ladle. While the metal is being brought up to heat, the pouring spout is sealed with fire clay to prevent loss of metal through oxidization. A separate gas-fired furnace of home make is employed for pre-heating the ladle which is transported on a low, wheeled truck running on tracks flush with the concrete floor. Maneuvering at right angles is made possible by a turntable.

The actual pouring is done while the boxes are resting on a large steel plate, on their sides when hub liners are cast; on their bases, when shoe liners are cast. Metal retainers, held down by weights and wedges, hold the molten metal within bounds.

Finishing of the shoe and wedge surfaces is next in order, whether the brass be old or new. With the system in use on the C & O it is possible to reduce the width between shoe brasses $\frac{3}{4}$ in. below standard before making it necessary to recast them and machine them back to standard. Because there is a decided "rock" or camber to the guides on the box, they are finished on a duplex miller with cam control for the heads, which simultaneously mill one guide surface on each side of the driving box. Fig. 4 shows a view of the machine with two boxes in position. In operation, one is being loaded while the other is in the cut.

There are several features of this production-type machine which mark an advance in machine tool application to a railroad shop, the same type of equipment being in use on cylinder block lines of automotive plants. In the first place, the table can be indexed by hand about a center pin and is locked in position by tapered square pins actuated by pneumatic cylinders. Cycle control is automatic, once the rapid traverse is engaged by the operator. Fixtures are mounted on the table to locate the boxes from the semi-finished inside surfaces of the crown brass and the walls of the cellar fit. Extra heavy screw posts carry clamps of generous size, having set screws at their ends for securing the work. Inserted-tooth cutters suitable for both side and end cutting, clean up both the wedge surfaces and the cambered guides in two passes, one for each guide. Extra heavy clamping is necessary because of the upward cutting reaction when finishing the upper guide. Fig. 5 gives a clear view of the fixture construction.

CELLAR fits are usually restored by arc welding, performed in a space in the central part of the bay, partitioned off by sheet-metal screens. Welding of steel cover plates to cover waste pockets is also done here in the routine changeover work for Alemite lubrication. Machining of the cellar fit is done in a drawcut shaper, Fig. 6, with the aid of a fixture shown mounted on the table. The work is held between six setscrews, three on a side, bearing against the previously machined wedge surfaces, and tightened by starwheels.

Axial clamping is by a bar with slotted ends through which extended studs pass and are fastened by wing nuts. The reaction is taken against the apron of the machine and for additional strengthening of the fixture, extended bearer pieces are held in sliding contact against the finished face of the machine head. The ram carries a

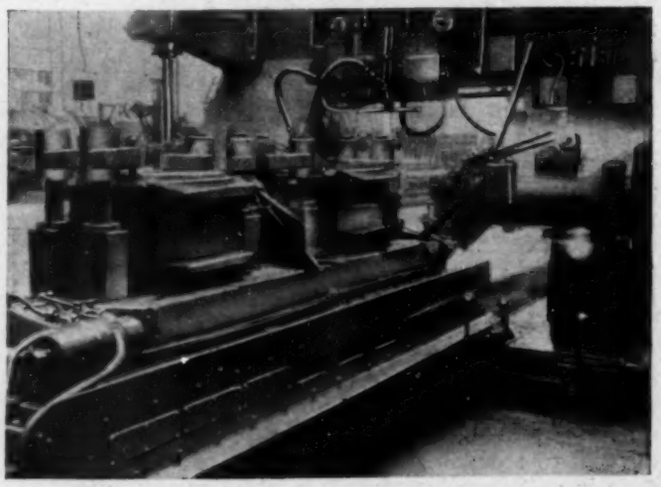


Fig. 4—An automotive production machine finds its way into the railroad shop. Indexing table, clamped pneumatically, cam control for the cutters, and automatic cycle control are the outstanding features

duplex cutter head so that both sides of the cellar fit are finished simultaneously, and the distance between them is set by the tools.

Hub liners are faced and crown brasses bored in vertical boring mills located alongside one another. Oil holes for changeover to Alemite fitting are drilled with a radial drill, much in the same manner as for the crown brass pin holes. These operations complete the machine work on the driving boxes. The remaining handwork such as chipping, scraping, and grooving of oil channels, is done at low benches with air tools. In order to reduce the hazard of flying chips, the benches have canvas screens hung from pipe frames, separating one side of the bench from the other.

IN the middle of the bay, directly in front of these benches are waiting the reconditioned wheel sets, rolled over from the adjoining wheel shop. A 2-ton electric hoist operated by hand controls from the floor and running on a small auxiliary bridge crane, serves this section of the shop and facilitates mounting and fitting the boxes on the wheel journals. When the boxes are applied to the axles, the grease cellars are assembled in position. Hanging vertical, the two boxes are self-aligning. In this position they are wedged against the face of the driving wheels by a 2x4 spreader which prevents them from rolling on the axles. In this condition they are picked up by a 15-ton crane and carried over to the extension tracks from the adjacent erecting shop.

Fig. 7—Reconditioned wheel sets meet finished boxes at this point. The auxiliary bridge crane with 1-ton electric hoist facilitates mounting the boxes on the axles

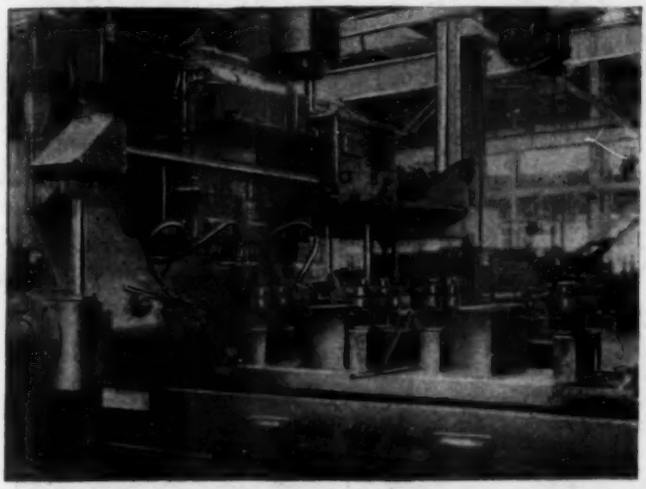


Fig. 5—Sturdy fixture of extra-heavy proportions assures accurate work on this semi-automatic planer-type miller

Fig. 6—Another special-purpose shaper. This one is tooled up for machining the cellar fit, previously built up by arc welding

■

Machining From a Base Line—*Discussion*

JAMES MCINTOSH

J. T. TOWLSON, on page 940, Vol. 72, of the *American Machinist*, says that the base of any machine or fixture should, if possible, be machined as a first operation. This statement is true enough as far as it goes. It is necessary, in addition, that the base line conform to a definite center line.

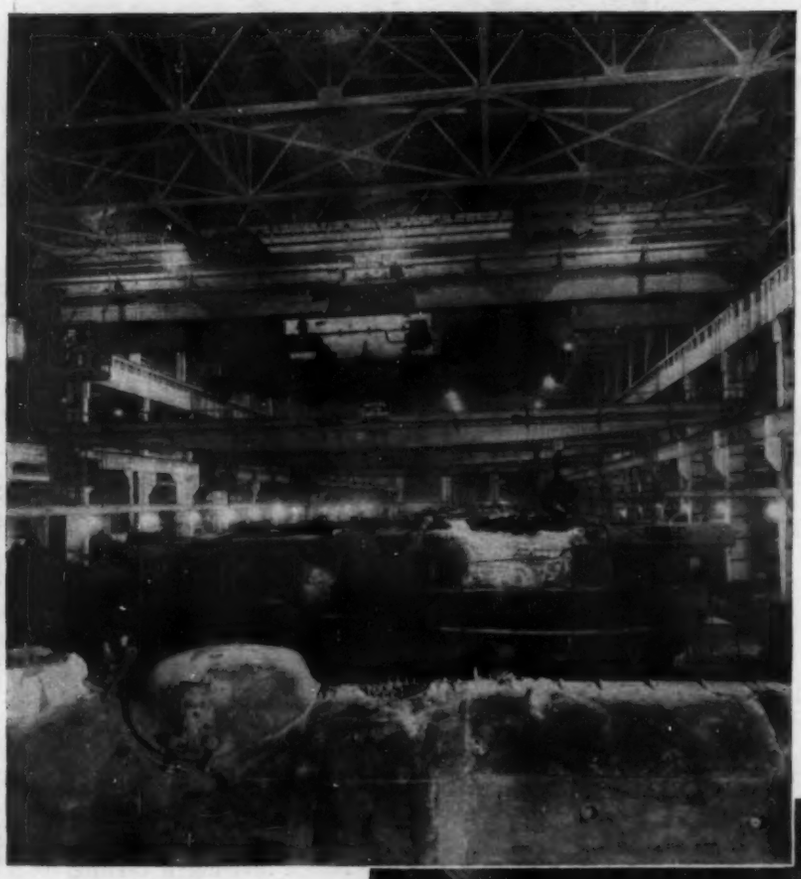
The usual practice of rough leveling a casting on a surface plate so that a base line satisfactory to all surfaces may be obtained, is entirely proper, provided the casting is free from strain and structural variations which may cause distortion after rough machining. The amount of material provided for machining should be definitely calculated to allow removal from opposite sides. The practice of cleaning off one surface and letting the excess go to the opposite faces is only inviting distortion troubles later.

The first consideration in establishing a base line is to level the piece by not more than three anvils located at points as widely apart as possible. Fixed anvils, and clamps that deliver pressure directly over the three points have proven their worth. The use of floating supplementary clamps to steady the piece and absorb cutter action and feed thrust, and a definite gage point to establish the level of the surface and maintain it, are also advantageous, for they eliminate danger from two troubles; a variation in depth from a definite important gage point, the chance of removing too much metal from one face or the other, and the hazard of warping after an unequal amount has been removed. Study, care, and the ability to decide values and avoid irregularities is of prime importance. Anything less than that creates a risk which usually means trouble.

SHEDDING LIGHT

On a Modern Railroad Shop

THE new C & O locomotive shops, at Huntington, W. Va. Photographs by courtesy of the Whiting Corporation and United Engineers & Constructors, Inc.

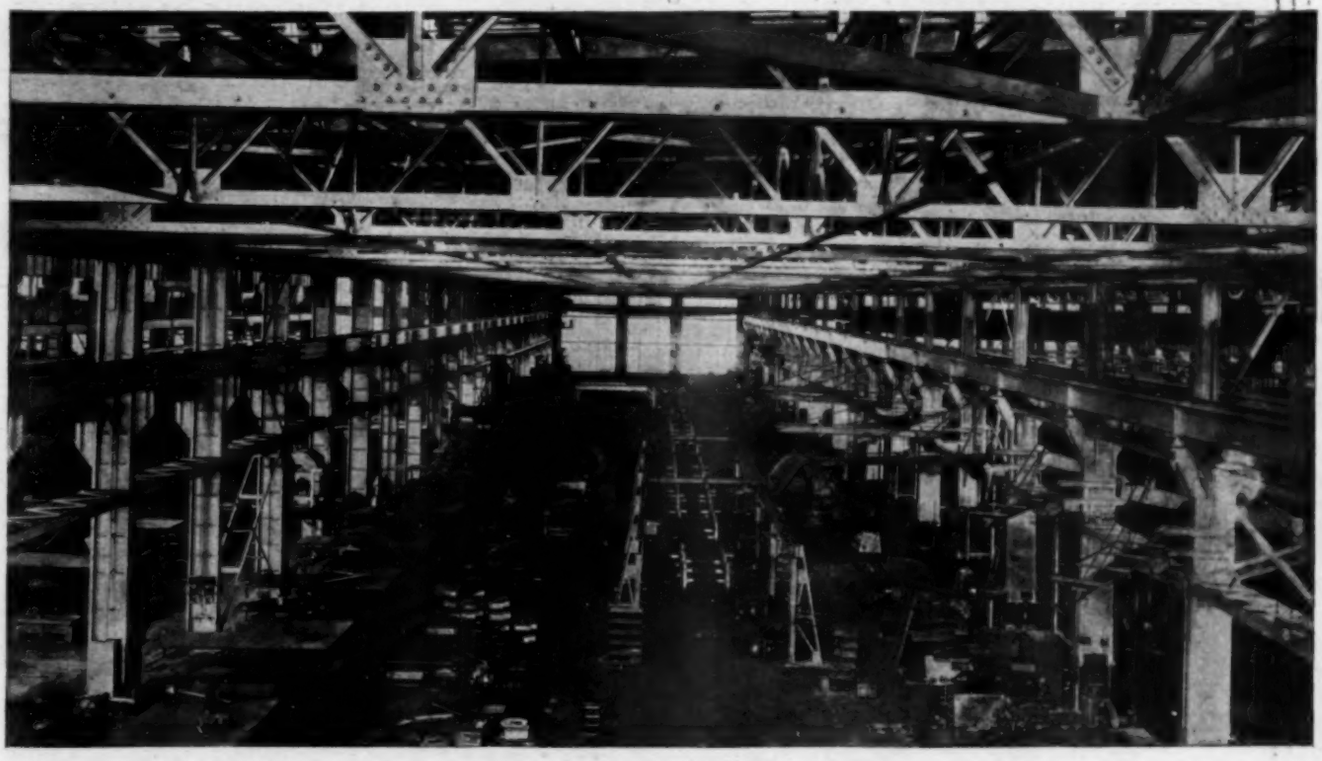


A night scene over the pits. High ceiling lights, lights with angle reflectors at each column, and white paint covering all structural work produce illumination of uniform intensity

Night view of the wheel shop. In this section, located next to the locomotive pit bay, the ceiling is lower and ceiling lights only are sufficient

Above—Daylight view of the same shop as pictured on the opposite page. The end wall is almost entirely of glass as is the step wall between this main bay and the adjoining one

Below—Daylight view of the wheel shop. Saw-tooth roof construction and high wall windows in adjacent bays account for the fine quality and quantity of diffused light in this section



The Foreman's Round Table

NO PARKING

"GOOD MORNING, Mrs. Graham," hailed Al as he stopped at Ed's house on the way to work. "The garden looks fine; Ed has been telling me how much time he has put in at it."

"It's a good thing for that husband of mine that you say that with a smile. The only thing Ed does around this house is to wear out the furniture. I can't get him to do a lick of work."

"What's that?" exclaimed Ed, coming around the corner. "Isn't it touching, the way a woman will defend her mate during his absence? And you, Judas, every time I leave you alone with her you start something. Come on out to the garage and climb into the car."

"How come you are driving in today?"

"Well, I want to have the oil changed and some repairs made, and I can leave it at the garage all day. I can't see why a concern as progressive as ours is supposed to be can't provide a parking place for its employees."

"Why should it?"

"But why shouldn't it? There are a lot of the boys that live out of town like we do, and it would be a convenience. When they lay out a factory, that should be the first thing to think of."

"Yes! It's funny they don't, isn't it? Space costs something in the city, feller, and there is no reason why the company should furnish garage space for those in the city that have no garages."

"They don't have to give the garage to us, we are willing to pay for it."

"Why don't you get up a co-operative company and build a garage then?"

"Oh, you can't expect anybody to risk his money like that. It's up to the company or the city to furnish a parking place of some sort."

"Yes, I've noticed that most men expect the company to furnish them not only with necessities, but with luxuries. And the same men that asked for them either sit back and criticise the quality, if they are free, or kick about the company making money off their employees, if they have to pay a nominal fee. In my estimation, parking space in a town like this comes under the head of a luxury."

"I don't know about that. There are maybe a hundred men that would park their cars if the cost was not too much. You could hire a piece of ground and put up some corrugated iron garages and charge, say, a dollar a month for open air or three dollars for a garage. Nobody would kick if the company did make a little money."

"No. Nobody except those that kept their cars there."

Parking in the streets around the factory is usually an impossibility. There must be some solution to the problem. How far is the factory responsible for the conveyances of its employees? Foremen and others are invited to discuss this question.

Suggested by George A. Fries

▸ ▸ ▸ Discussion of Former Topics

Quality or Quantity?

The apprentice is again becoming one of the most important concerns in all educational programs of industry. Some firms are starting several groups of learners. Other young men are being trained to fit into the trades to fill executive openings, and to get out production. Each of these groups has a separate program to follow, but they should all be brought together as a body to discuss problems of the company as a whole, as well as problems of their own. They should be not separated from the rest of the workmen in the plant; their contacts with foremen and workmen in the different departments give them the opportunity to work under natural conditions. As practical as you may make a separate shop, it will lack that shop atmosphere essential to all in training.

Apprentices should be given separate instructors in the departments where they work. These instructors should be good teachers and good mechanics. In appointing instructors, firms should not take all the shop work away from them, but should make this their minor work along with their instruction work. This will keep them up to date on the plant's methods so that they may be examples to the apprentices who are working around them.

The methods used by industry the country over to train men from the lowest to the higher types of workers show us that there must be some reason for all this teaching. Firms want better men to fill positions that are open, men who are steady, interested in their work and in the product they are making, and men who will put out better products at lower costs.

—J. Morgan Johnson, *Apprentice Instructor, Moline Public Schools.*

High Rates

There is good reason for the growing suspicion that pacifism is invading management and that there is a tendency to confuse weakness with altruism. High rates of pay are like precision machine tools — not to be applied to every job indiscriminately, but rather to be used judiciously for particular applications. Despite the fact that relative wages do not buy groceries, the difference between the highest and lowest rate of pay for any trade in a given locality is of far more significance to management in the aggregate than it is to the employee as an individual. It is important, therefore, that the higher rates should be wisely used as incentive and reward for exceptional consistent performance.

The foreman who can hire good men at the top rate only is being unfair to any men he now has at less, and he is confessing his inability to sell his own organization as a good place to work. Likewise, the foreman who presents a wholesale raise list is confessing a weakness, for if he waits until his ideas assume these proportions he is either registering outside pressure and influence or a mere attempt to square himself against this pressure.

—Eli Smith, *Engineer, Russell & Company.*

Honest Graft

The purpose of foremen's meetings is to develop and train higher class supervisory material. The company receives some benefit from increased efficiency on the part of its men, but the men profit more. They are fitting themselves for advancement, not only with the present company but with any concern they may be associated with in the future.

In most places men pay for the privilege of going to school and improving their training and knowledge. They not only pay, but they are glad to attend, and they make sacrifices to do so.

If a company provides an instructor, a meeting place, and a free supper, it has more than done its share. Men seldom appreciate what they get for nothing, and it is poor policy to pay them straight time for attending school, let alone overtime. The type of man who is unwilling to give a few hours a week for his own improvement is not the type of leader who will ever develop into a worthwhile asset to any company.

—James K. Matter, *Supervisor, E. G. Budd Manufacturing Company.*

Government Work

The question of whether to allow work of a personal nature to be done on company time or not, always will be a source of contention.

There are two sides to this question. Perhaps the planer has a job set up that will require two or three hours to complete a cut, during which time the operator has nothing to do but sit on his stool and dream, or wander around the shop and swap yarns. Why shouldn't he be allowed to fix his fishing reel or the youngster's Kiddy Kar as long as it does not interfere with the work he is doing for the company?

I am sure his attitude toward the company will be much kindlier if the foreman, seeing him fixing his reel, stops and asks "Where are you going fishing next Sunday?" than it would be were he told to "put that thing away and tend to what you are paid for doing."

On the other hand, there is always someone to overreach and go so far in doing government work that it is necessary to issue an order forbidding any personal work being done at all.

—George R. Miller, *Head Millwright.*

Experience or Authority?

The trouble it takes to fit a highly trained specialist into an organization is a powerful reason for training men in the organization. Almost always the exceptionally good man who is brought in from the outside is somewhat of an egotist—and has a right to be. He is also an individualist and resents having to accommodate himself to such local practices as having someone else grind his drills or repair his machine. Here again he is often right. As he says, "Does anybody in the shop know more about this machine than I do?"

The foreman who hires such a man may congratulate

himself on getting him ready made instead of going through the laborious process of training him. He should not overlook, however, the fact that there are compensating disadvantages. No matter how expert the man is, there is work to be done in introducing him into the organization, more work, probably, than there would be with a person less skilled.

There will be problems of getting along with the organization, and it is an important part of the foreman's job to solve them in advance. The loss of a good man, or the disrupting of the organization may result if the problems are permitted to grow into grievances. The foreman should explain at the start that it is the practice to have drills ground and machines repaired by someone else. If an exception is to be made in the case of the new man, an understanding should be reached with the other men affected. —GLENN F. GRIFFIN.

When Personal Tools Are Damaged

Does a good workman take pride in his tools? Absolutely yes! Only the other day we started a new "stub" lathe in operation to replace an old lathe turning boiler plate, which we all know is a "rotten" job. When I asked the operator how he liked it, he answered, "Oh, boy, a man can get some satisfaction out of his job with a decent machine like this." That is my answer to that question.

Does the appearance of the shop and equipment influence applicants? It most certainly does. Some time ago a friend of mine was looking for a position. He entered a shop which I shall leave nameless. The shop was dirty, the machines antiquated, the men listless. Although the offer was good my friend turned it down, for, as he told me, he could get no satisfaction out of a job under those conditions. I certainly agree with him.

—CHARLES R. WHITEHOUSE, *Standards Engineer, The Holtzer-Cabot Electric Company.*

High Rates

The policy of pacifying the dissatisfied workman by granting him a wage increase is undoubtedly the most fallacious attitude any executive could assume. At the outset, such a step probably serves the purpose for which it was originally intended, but it also creates a widespread adverse sentiment among the remainder of the force who do not share in the increase.

The situation regarding the one workman has been relieved, but a more serious one has developed that cannot be overcome until every man has been granted a raise in pay.

A wage increase is but temporary relief to the disgruntled mechanic, since the novelty wanes with the passing of each day. Consequently, it is but a matter of time before he again becomes a menace to the efficiency of the entire shop.

The most forceful and effective policy is the strict adherence to time schedules under which no one can possibly shirk his share of production, wage increases being disregarded in all excepting meritorious cases. By such a policy it is impossible for the mechanic to "lay down" on the job regardless of the fact that he thinks an injustice has been done him by the superior in charge.

—PETER HAGEN, *Engineer, Naval Aircraft Factory.*

Experience or Authority?

It is refreshing to learn now and then of a man capable of doing his own planning, of repairing his own machine, and grinding his own drills and tools especially for the job at hand. Nevertheless it is up to Ed, with his judgment of human nature and his ability to analyze the psychological effect, to decide what steps to take: fire, or promote. —A. W. AINSWORTH, *Wm. Ainsworth & Sons, Inc.*

Quality or Quantity?

It is the writer's opinion that Ed was entirely justified in saying he couldn't be bothered with apprentices. It is obvious that Ed's main job is production. Getting out production and training apprentices are two different and distinct jobs, one invariably interfering with the other. There is no place in the production line for an untrained apprentice.

Generally speaking, if apprentices are segregated, if reasonably good machinery is provided, and a competent instructor is placed in charge, the result will be skilled men, trained to turn out quality work at a minimum of loss in time and material. —LOUIS J. LUBIN.

Quality or Quantity?

The apprentice boy coming into the shop is the rawest material possible to work with, and if the foreman cannot take this raw, unspoiled material and turn out a finished product, then he, and not the boy, is to blame.

One very good way to store up trouble for the future is to employ the first boy who asks for a job—preferably to allow a clerk in the employment office to do it without consulting the foreman. Pay the boy about one-third the rate paid the poorest helpers in the shop; consider the boy as just a low priced helper, and give him plenty of monotonous, uninteresting work. Give him no special instruction or consideration. If, under these conditions, the employer obtains either quantity or quality, he has received far more than he deserves.

On the other hand, if the foreman is himself permitted to select the boy from a number of candidates, he should, and invariably does, feel responsible for his progress.

Whenever possible, select boys who have had a year or two of high school, watch them closely, and if they show no interest or aptitude for the trade during the first three or four months, which may be considered as a probationary period, replace them. It is far better to do so at this time than to wonder what to do with them three years later.

Have the boy attend an evening trade school. This is advisable even though the shop maintains a school. Prepare a shop training course, assigning the boy to each element of the trade for a certain period of time. If this course is followed conscientiously and intelligently, the apprentice will progress rapidly and grasp the elements of the trade quickly.

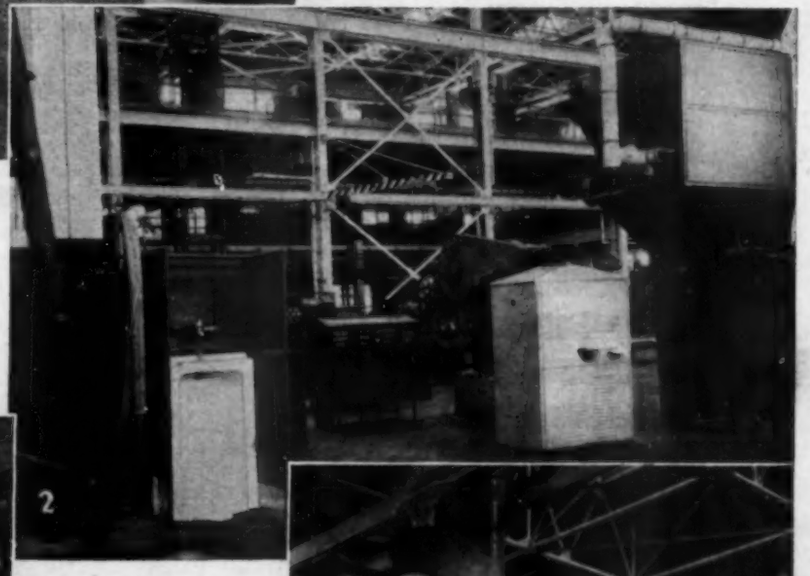
What greater kick can the foreman get from his job than to have an excellent mechanic say, "Yes, sir, I learned my trade under Ed Brown," or to look forward to the day when his own position will be filled by this same apprentice boy and he himself has gone on up.

—ED SEARLES, *Master Mechanic, Naval Aircraft Factory.*

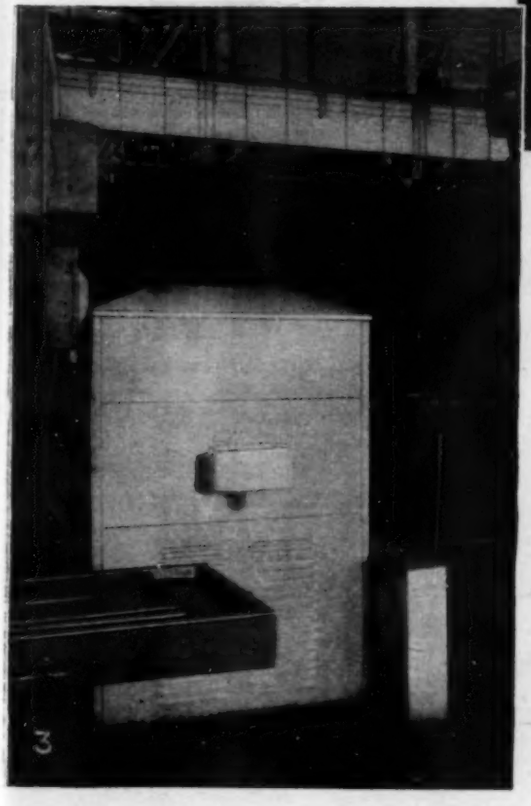
A Comfortable Place to Work

Photographs from the Huntington (W. Va.) shops of the Chesapeake & Ohio Railway Company

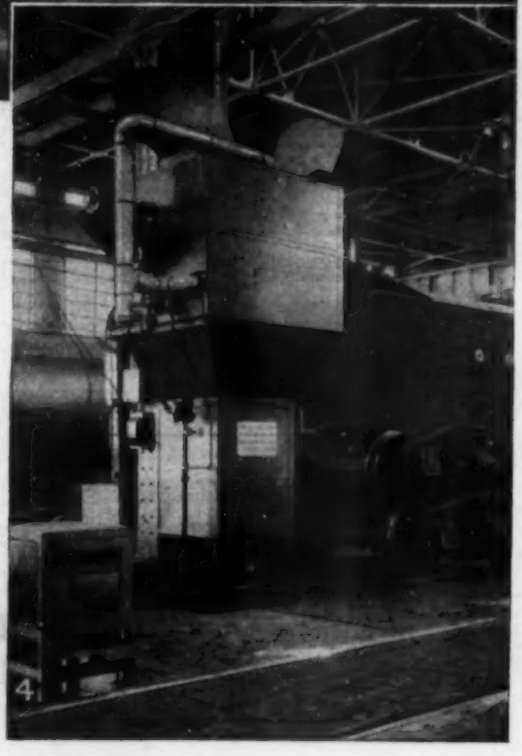
Spray wash fountains, trash receptacles, and well swept floors inspire clean habits in this locker room, located on a mezzanine floor overlooking the main shop



Drinking fountains with cooled water, comfort stations right on the spot, and unit heaters make life comfortable in summer or winter in this railroad shop



Although only a small portion of the workers are Negroes, special facilities are provided for them



Gone are the days of the ubiquitous salamander. The unit heater with electrically driven fans has found its way into the railroad shop

AMERICAN MACHINIST 1930 INVENTORY

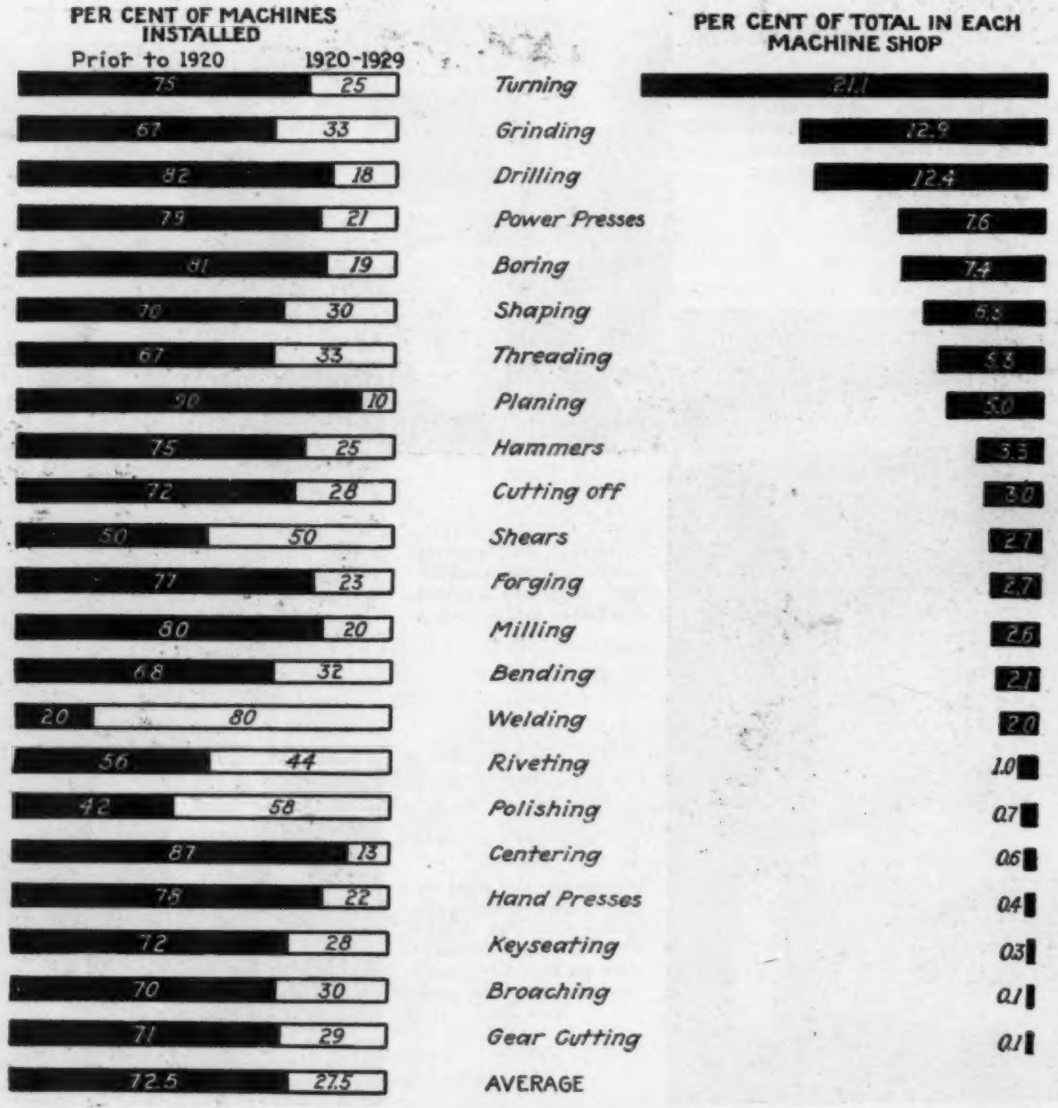
of Metal-Working Equipment

Report No. 2—Machines for building and repairing railroad cars and locomotives

AT THE time of the 1925 inventory, the railroad repair shops reported 65 per cent of their machine shop equipment over 10 years of age; the car and locomotive manufacturers, 52 per cent. The 1930 count shows a rise to 72.5 per cent for the combined groups, a decided change in the wrong direction.

More than 46 per cent of the present inventory is included in the three general classes of turning, grinding, and drilling. This agrees with the former railroad repair shop figure of 46 per cent and the railroad car and locomotive builders' 40 per cent. In the present classification, the percentage of turning and drilling equipment over ten years old is above the general average, while that of grinding equipment is slightly below.

Present lack of demand for railway cars offers an exceptional opportunity for their repair, an opportunity which should be taken advantage of before the demand returns to normal. Rejuvenation of the machine shops should certainly be considered a preliminary step that will pay big returns.


PER CENT OF MACHINES INSTALLED
Prior to 1920
1920-1929
PER CENT OF TOTAL IN EACH MACHINE SHOP
Turning 75 25 21.1
Grinding 67 33 12.9
Drilling 82 18 12.4
Power Presses 79 21 7.6
Boring 81 19 7.4
Shaping 70 30 6.3
Threading 67 33 5.3
Planing 90 10 5.0
Hammers 75 25 3.5
Cutting off 72 28 3.0
Shears 50 50 2.7
Forging 77 23 2.7
Milling 80 20 2.6
Bending 68 32 2.1
Welding 20 80 2.0
Riveting 56 44 1.0
Polishing 42 58 0.7
Centering 87 13 0.6
Hand Presses 78 22 0.4
Keyseating 72 28 0.3
Broaching 70 30 0.1
Gear Cutting 71 29 0.1
AVERAGE 72.5 27.5

Machines for Building and Repairing Railway Cars and Locomotives

	Total Number in Plants 1930	Number Installed Before 1920
LATHES		
Engine	18,984	14,873
Hand Turret	495	431
Power Turret	3,211	2,119
Automatic and Semi-Automatic	584	571
Chucking (Not Chucking Machines)	165	152
Speed and Bench	419	355
Wheel, R.R.	2,018	1,459
Axle, R.R.	3,147	1,688
Crankshaft	....	....
Toolroom Type	609	444
Other	419	343
CHUCKING MACHINES (Not Chucking Lathes)	....	....
SCREW MACHINES		
Hand	51	38
Automatic, Single Spindle	114	51
Automatic, Multiple Spindle	....	....
CENTERING MACHINES	901	787
MILLING MACHINES		
Hand (No Power Feed)	51	25
Bench	13	13
Plain (Knee and Column Type)	1,091	838
Universal (Knee and Column Type)	749	584
Vertical (Knee and Column Type)	990	926
Lincoln Type Manufacturing	....	....
Continuous, Rotary Table or Drum, Type	25	25
Planer Type	457	355
Other	368	241
GEAR CUTTING MACHINES		
Rotary or Milling Type	76	63
Hobbing	25	13
Planing or Shaping	63	38
Other	13	13
BORING MACHINES		
Horizontal Boring, Drilling and Milling	2,081	1,853
Vertical Boring Mills	7,652	6,180
Other	393	292
JIG BORERS	470	266
DRILLING MACHINES		
Radial	7,512	6,256
Upright, One Spindle	7,094	5,685
Upright, Two or More Spindles	1,117	825
Upright, gang (Two or More Heads)	190	51
Sensitive, One Spindle	1,345	850
Sensitive, Two or More Spindles	127	114
Sensitive, gang (Two or More Heads)	....	....
Two, Three and Four Way	....	....
Other	317	279
THREADING MACHINES		
Single Spindle Tapping	216	140
Multiple Spindle Tapping	330	317
Pipe Threading and Cutting	2,284	1,358
Bolt Threading and Cutting	4,505	3,134
Thread Chasing	127	76
Thread Hobbing and Milling	51	25
Thread Rolling	51	51
Other	....	....
PLANERS		
Open Side	1,421	1,256
Double-Housing	5,507	4,467
SHAPERS		
Vertical	38	13
Horizontal	6,243	3,921
Slotters	2,703	2,335
KEYSEATING MACHINES	495	355
BROACHING MACHINES	127	89
GRINDING MACHINES		
Plain Cylindrical	558	330
Universal Cylindrical	355	216
Surface, Reciprocating	279	89
Surface, Rotating	228	165
Internal	431	63
Crankshaft	....	....
Cutter	1,739	1,358
Floor, No Feed Attachments	11,586	7,995
Bench, No Feed Attachments	609	431
Abrasive Disk	1,117	673
Abrasive Belt	13	....
Centerless	....	....
Other	1,586	1,053
POLISHING AND BUFFING MACHINES (Including those in Plating and other Depts.)		
Abrasive Wheel, Hand Operated	926	368
Abrasive Belt, Hand Operated	51	....
Automatic and Semi-Automatic	63	63
LAPPING MACHINES	13	....
HONING MACHINES	13	13
CUTTING-OFF MACHINES		
Parting Tool Type	38	13
Power Hack Saw	1,561	1,015
Rotary Cold Saw	850	660
Bandsaw	381	279
Other	1,497	1,129
WIRE FORMING MACHINERY		
Spring Coiling	....	....
Other	....	....
WELDING AND CUTTING MACHINES, (See also Welding and Cutting Outfits)		
Resistance Welding, Butt	165	25
Resistance Welding, Spot	38	13
Resistance Welding, Seam	25	....
Resistance Welding, Other	38	25
Arc Welding	1,117	305
Electric Cutting	622	140
Gas Welding	165	38
Gas Cutting	685	38
RIVETING MACHINES, STATIONARY		
Pneumatic	787	330
Hydraulic	647	482
Power	51	25
PRESSES		
Punching Machines	1,167	939
Combined Punches and Shears	1,853	1,777
Hand, Arbor	330	216
Hand, Light Punch Press Work	216	190
Foot, Light Punch Press Work	76	76
Power, Crank Type	1,041	787
Power, Toggle Type	38	....
Power, Double Acting	....	....
Power, Dieing Type	89	63
Power, Trimming Presses	317	266
Power, Forcing, Arbor, Wheel	1,447	1,180
Hydraulic, Bending, Forming, Drawing	698	520
Hydraulic, Wheel Forcing, etc.	2,830	2,145
Baling, Power and Hydraulic	51	13
Other	1,282	909
BENDING AND STRAIGHTENING MACHINES		
Bending Brakes	508	266
Bending Rolls, Horizontal	1,307	1,104
Bending Rolls, Vertical	....	....
Straightening Rolls	38	38
Other	1,218	673
SHEARS		
Knife	3,160	1,612
Rotary, Slitting	508	292
NIBBLING MACHINES	241	102
HAMMERS		
Drop	190	190
Helve	431	203
Spring	216	165
Steam	3,033	2,348
Pneumatic (not portable)	419	330
Other	470	355
FORGING MACHINES		
Bulldozers	787	571
Hot Forging Machines	1,269	977
Cold Headers, Bolt, Nut, etc.	13	13
Cold, Swaging	51	51
Forging & Flanging Presses, Hydraulic	812	609
Other Forging Machines	926	761
Total	142,700	103,708

IDEAS FROM PRACTICAL MEN

A Hammer-Blow Intensifier

J. T. Towlson
London, England

A DEVICE for forcing ship's propellers from their tapered seats on the tail shafts is shown in the illustrations. The pump for generating the pressure is shown in Fig. 1. At *A* is the inlet through which the

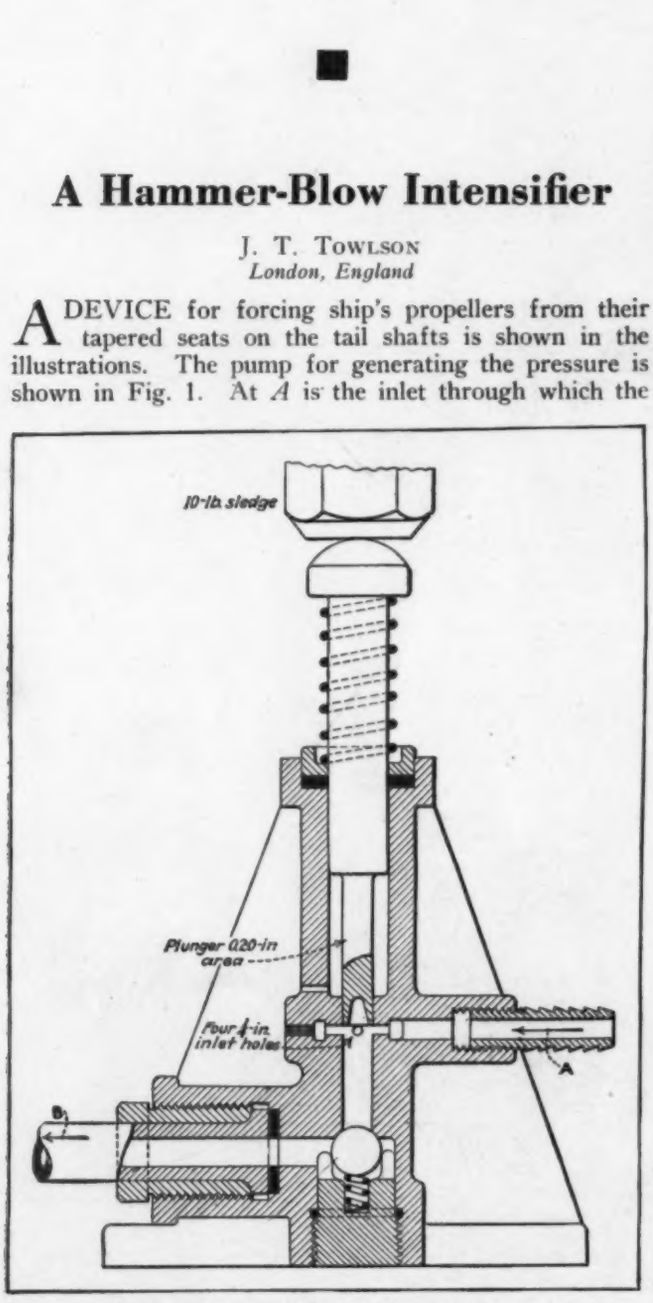


Fig. 1—Pump operated by hammer blows

pump is filled with fluid, while at *B* is the outlet, connected to the forcing device. Four holes are drilled in the pump barrel, spaced 90 deg. apart, through which fluid is admitted under the bell-mouthed ram. The upper end of the ram is enlarged in diameter and is held upward by a helical spring. A ball check prevents the fluid under pressure from returning to the pump barrel.

The forcing device, shown in Fig. 2, is a well-brazed copper tube, bent to a segment of a circle, closed at the ends and flattened, as shown. It is provided with inlet and outlet connections, the inlet being connected to the pump, while the outlet is normally closed by a threaded cap. The effective area of the flattened tube is 224 sq. in., so that an internal pressure of from 200 to 500 lb. per sq.in. will exert a total pressure of from 44,000 to 112,000 lb. over the whole area.

In operation, the forcing device is placed between the propeller hub and the flange of the bushing in the stern tube. If the space between these parts is greater than the thickness of the forcing device, horseshoe-shaped blocking can be used to fill in. With the forcing device in position and connected to the pump, a few blows from a 10-lb. sledge on the plunger will expand the flattened tube sufficiently to loosen the propeller from the shaft, no matter how tightly it may be seated. If desired, two forcing devices can be used, one on each side of the shaft, both of them being connected to the pump.

Fig. 2—The forcing device

After the consequent expansion of the forcing device to its allowable limit, it can be flattened again to its original shape by a hammer, or under a press. Should the forcing device be fractured through continuous use, its replacement will cost less than to remove the propeller by some of the methods that are taught in the technical schools.

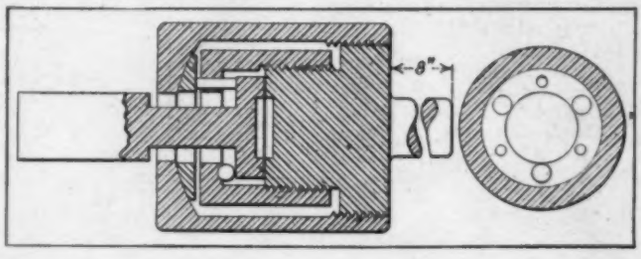
A Floating-Type Button Arbor

F. J. Wilhelm

In the illustration is shown a type of button arbor that is intended to take the place of the ball wiggler, or wobbler, for use in a jig boring machine, or in any type of machine in which the spindle revolves. Its advantages are that it can easily be trued and that it presents a good surface against which to set the gage blocks.

The shank is held in a chuck in the spindle of the machine, and is threaded to suit the inner and outer shells. It is recessed at the inner end, as is also the inner end of the arbor proper, so that both parts will have a good contact bearing. The partially-closed end of outer shell has a concave surface on the inside, against which is placed a convex pad, the two surfaces being lapped together so that the pressure on the other parts will be equalized.

In the partially-closed end of the inner shell are three loose pins, slightly longer than the thickness of the shell end and equidistantly spaced in a circle. At one end,



the pins bear against the flat side of the convex pad, while at the other end they bear against the underside of the head of the arbor. On the inner side of the partially-closed inner shell are three balls, equidistantly spaced, both in regard to themselves and to the three pins. The smaller circles indicate pins, the larger ones balls.

From the construction it will be seen that when the outer shell is loosened, the arbor proper is free to move at a right angle to its axis, the underside of the head rolling on the balls, the amount of motion being limited only by the clearance spaces in the parts through which its inner end passes. When the outer shell is tightened, the convex pad is forced against the pins, they, in turn, bearing against the underside of the arbor head and forcing it against the inner end of the shank.

In operation, the outer shell is loosened enough to permit the arbor to be trued by pressing against it a scale or other hard object while it is revolving, gradually moving the scale toward the center until the arbor runs true. After truing the arbor, the outer shell, which is knurled, is grasped by the hand while the machine is running, screwing it on the shank and holding all parts firmly without disturbing their adjustment.

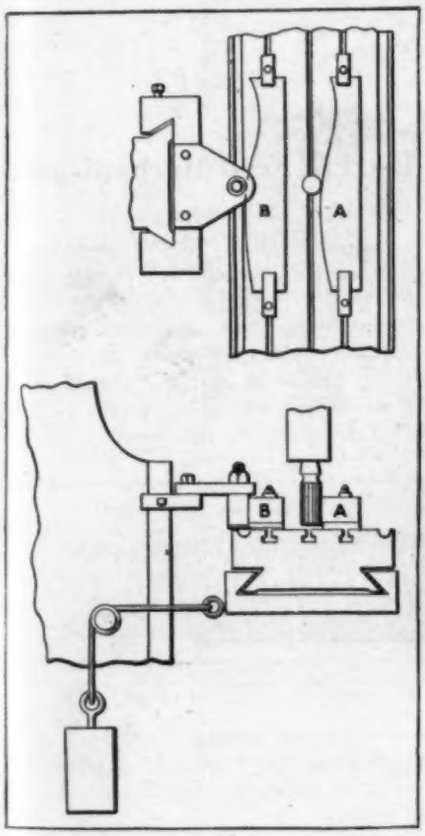
■

Precision Boring in a Vertical Milling Machine—*Discussion*

CHARLES KUGLER

The article by Marshall Bidwell, under the title given above, on page 921, Vol. 72, of the *American Machinist*, interested me because I have seen the same principle applied to work of a different character.

It is sometimes necessary to replace a forming punch or die, and when conditions permit the part to be replaced can be used as a former for milling the new part to shape and size. A plate, carrying a roller of the same diameter as that of the cutter, is attached to a strap clamped across the face of the machine column, as shown in the illustration. The new part is roughed out in the shaper and is then mounted on the table of the milling machine, as shown at *A*. The old part, used as a former, is placed at *B*, and must be in contact with the roller at all times. To keep it in contact with the roller, the cross-feed screw is removed and a cord attached to the saddle by one end is passed over a pulley mounted on the column, the cord carrying a weight at its other end. Thus, as the table is traversed it will be moved in or out, following the contour of the part in contact with the roller, and the new part will be milled to the same contour as that of the old one.



It is, of course, necessary that the face of the old part and the surface being cut on the new part be at the same distance as that from the center of the roller to the center of the cutter.

In regulating the depth of cut, the parts can be moved closer together, or the plate carrying the roller can be slotted for adjustment of the roller pin.

■

Making Endless Belts—*Discussion*

JORAN KYN

In an article under the title given above, on page 813, Vol. 72, of the *American Machinist*, Arthur V. O'Brien tells how he made endless belts experimentally. Reading the article reminded me how endless belts are made commercially by a well-known concern.

The webbing from which the belts are made is woven from long-fiber yarn in two plies that can be separated by a pair of scissors. In joining the ends of a belt cut from a roll of such webbing, the plies are separated for a distance of about two inches from each end. The top ply is cut off at one end and the bottom ply at the other end, and the remaining fabric is raveled exposing the warp, as at *A*, Fig. 1. The ends are then brought together, the fabric being butted and the raveled warp-ends overlapping. The overlapping ends are then sewed to the fabric for a part of their length by several rows of stitches, appearing as at *B*. In order to thin the warp ends so that the joint will be smooth, they are held against a rapidly-revolving wire wheel, the result being that they are thinned and combed into a fine, silk-like fiber, as indicated at *C*, Fig. 2. The final process is to sew down the combed-out warp ends to the fabric, on both sides, giving the finished joint the appearance shown at *D*. In passing such a belt through the fingers, it is almost impossible to detect the joint by feel.

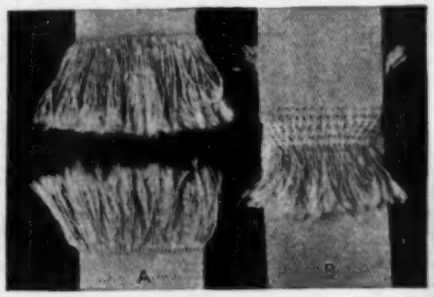


Fig. 1—*A*. Ends raveled, exposing the warp. *B*. Warp ends overlapped and partly stitched to fabric

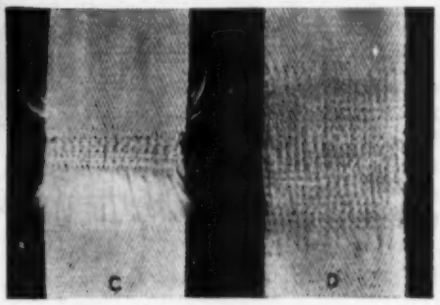
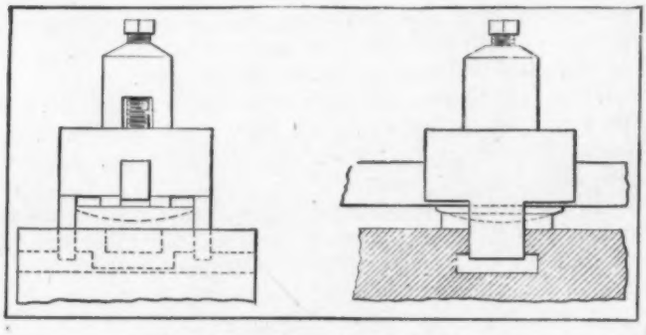


Fig. 2—*C*. Warp ends after being combed. *D*. The finished joint

Preventing Lathe Tools From Swinging

H. Moore
Hamilton, Ontario, Canada

When taking heavy cuts on lathe work having projections, I use a locking collar to prevent the tool from swinging away from the work. The collar, as shown in the illustration, is just a piece of round steel, bored to fit the toolpost and slotted to fit the shank of the tool.



Locking collar for a lathe tool

The bottom is milled to leave two lugs at right angles, fitting the narrow part of the T-slot in the toolblock.

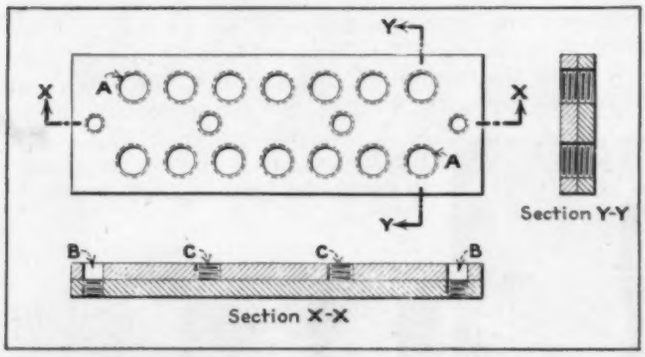
In use, the collar is dropped over the toolpost before tightening the tool. Of course, the use of this collar in a lathe having a plain rest, makes it impossible to set the tool in any position but at a right angle to the line of centers. For other than a right angle, a lathe having a compound rest can be used.

■

Fixture for Slotting Screws

Harold F. Karrenbauer

After trying many methods of holding screws for slotting the heads, none of which proved entirely satisfactory, we finally made the device shown in the illustration. It consists of two plates having two rows of holes *A* drilled and tapped through them to accommodate the screws to be slotted. Two holes *B* are drilled at the



ends for screws to bind the plates together, the holes in the top plate being clearance holes, while those in the bottom plate are tapped. Two holes *C* are drilled and tapped in the top plate only, their purpose being for screws to bear against the bottom plate and to force the two plates apart.

In operation, after the screws to be slotted have been put in place, the screws *B* are unscrewed one or two threads and the screws *C* are tightened. The result is that the plates are separated, jamming the threads of the screws to be slotted, holding them securely. The fixture is held in the vise of the milling machine, and two cutters are used, one for each row of screws.

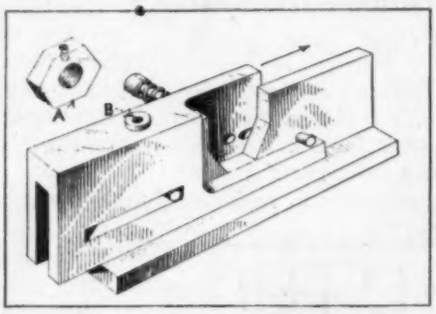
■

A Drilling and Tapping Fixture

Charles H. Willey
Assistant Plant Superintendent,
Hoyt Electrical Works

In one of our assembly jobs we use a large quantity of brass nuts, $\frac{1}{8}$ in. thick, such as the one shown enlarged at *A*. The nuts are required to be drilled and tapped through one of the flats for a No. 2-56 setscrew for positive locking.

The fixture, as shown in the illustration, consists of a T-shaped base on which is mounted a sliding member. In the vertical web of the base is a hole to receive the nuts, the nuts being confined therein by moving the sliding member over their exposed faces, and against a stop pin. When the sliding member is against the stop pin, the drill bushing *B* is centered over one of the flats, and is in correct alignment for either drilling or tapping. When tapping, the bushing is removed and one of bronze, having a hole to suit the tap, is substituted.



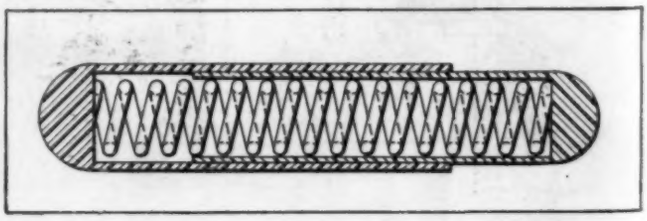
Affixed to the rear of the sliding member is a spring pin that serves both as a handle for sliding that member, and as an ejector.

■

Spring Case Used in Feed Mechanisms

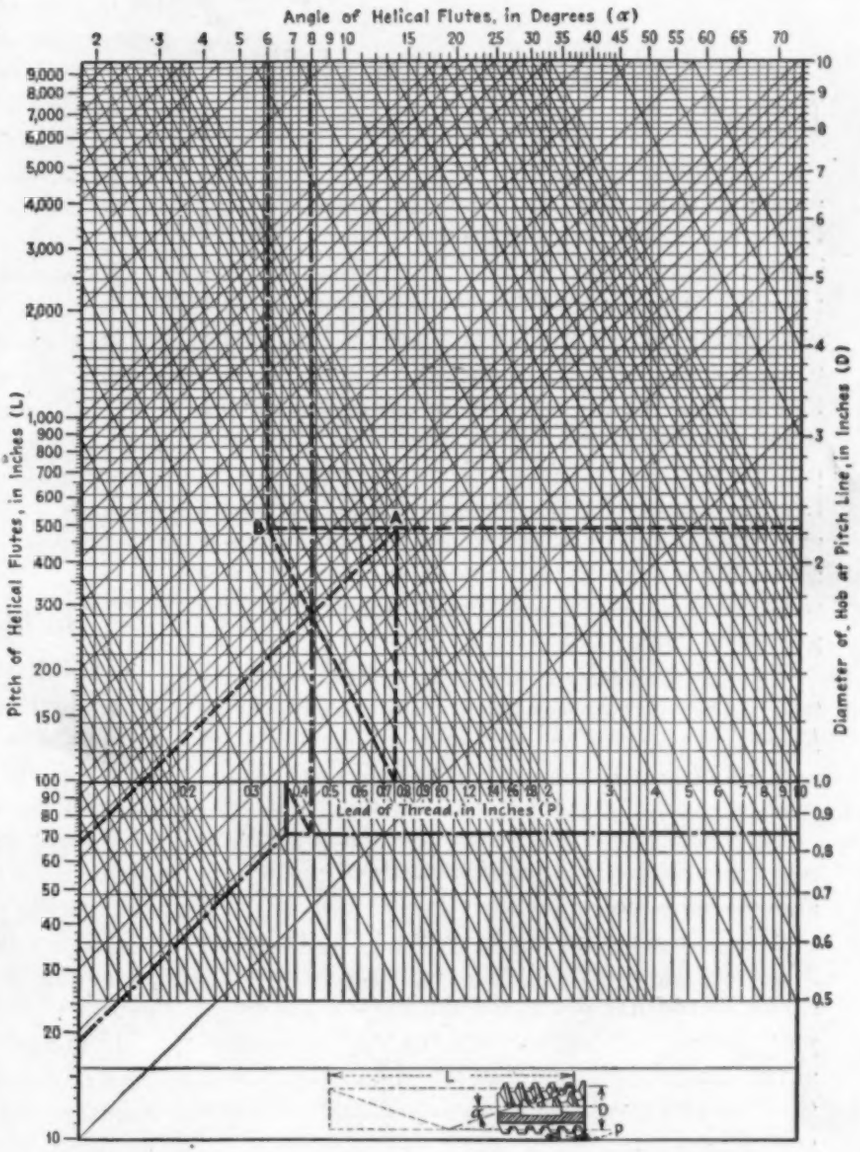
Charles F. Smith

The use of compression springs is so common in building feeding and other mechanisms for punch press work that I have adopted a standard form. By mounting the spring in a telescoping case as shown there is no buckling of the spring in action nor is it possible to catch stock or wiping cloths in it. The round ends of the case enable it to be sprung into recesses or out of them very easily for assembly or disassembly.



The cases can be made from tubing with end pieces put on or can be bored from the solid. It is advisable to have the bottom square so as to afford a good seat for the spring at each end.

Hob Data Chart



WHERE hobs are to be fluted helically, both the lead and the angle of the flutes can be determined from the accompanying chart. No calculations are necessary, but, of course, the pitch diameter of the hob and the lead of its thread must be known. The data are almost always known, but a laborious calculation is often required before the lead and the angle of the flutes can be obtained. Increased accuracy can, of course, be attained by increasing the size of the chart.

Example: A hob having a lead of 0.75 in. and a pitch diameter of 2.25 in. is to be fluted helically so that the faces of its teeth will be at an angle of 90 deg. to the flutes at the pitch line. Find the pitch diameter of the hob at the right of the chart, and the lead of its thread on the horizontal line near the bottom. Draw lines from these points intersecting at *A*. From the intersection *A* draw a diagonal line downward, to the left, parallel with the lines of the chart inclining in that direction, to the left-hand edge of the chart. There it will be found that the lead of the helical flutes is 67 in. From 0.75, near the bottom, draw a diagonal line upward, to the left, parallel with the lines of the chart inclining in that direction, and continue the horizontal line from *A* to the left until these two lines intersect at *B*. From the intersection *B* draw a vertical line to the top of the chart. There it will be found that the axial angle of the flutes is 6 deg. This procedure is indicated by the dotted lines.

For a hob having a lead of 0.375 in. and a pitch diameter of 0.85 in., it will be found, by following the dash-dot lines, that the lead of the helical flutes is 19 in. and their axial angle is found to be 8 deg.

Contributed by K. Takahashi, Tokyo Prefecture, Japan

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American Machinist

Editors: KENNETH H. CONDIT AND FRED H. COLVIN

New York, August 21, 1930

VOL. 73 NO. 8

Contrast

IF one will begin with the leading article and read consecutively through this issue, he will readily understand why *American Machinist* is devoting the lion's share to the shops of the Chesapeake and Ohio Railway Company, Huntington, West Virginia. New buildings, new arrangements, new equipment in profusion—all designed to put locomotive repair on a continuous production basis. The shop layout, the production methods, and the equipment are described and illustrated in detail. Equipment is analyzed; present practice is compared with previous practice. In a manner of speaking, the reader is taken on a personally conducted tour of the premises—a capping climax to the important series of railroad articles which began on page 149 of the present volume.

The editors desire to express grateful appreciation to the executives of the Chesapeake and Ohio Railway Company, whose courtesy, open-mindedness, and co-operation made this issue possible.

* * *

Further along in this issue, one will come upon a graphic report showing the status of machinery and machine-tool equipment in the general railroad field, the second report of the 1930 *American Machinist* Inventory. The proportion of new machines to old has decreased during the five years just passed. A comparison of the equipment analysis of the Chesapeake and Ohio shops with the inventory will offer almost anyone a vivid study in contrast.

Handicapping the Best Mousetrap

EMERSON'S well-known statement about the world wearing a path to the door of the man who makes the best mousetrap has been frequently quoted. Sometimes it is used to bolster up belief in non-aggressive selling methods. Or it may help one to satisfy himself that location plays no part in business success.

There are a few firms whose shops are far from the beaten paths of commerce, who have been conspicuously successful in building both businesses and reputations that can well be envied. In every case that comes to mind, however, these concerns make highly specialized machines, rather than those of the common, garden variety. It is doubtful if even especially good machines of standard types could survive the competition of more accessible locations. And in none of these cases do the builders sit idly by until customers find their way to the shop door. Instead they use the best kind of guide boards and even go out personally and invite possible customers to come and look them over.

No matter how good a mousetrap you make, it is dangerous to wait for the possible customer to find out about it as best he may. That is too frequently the reason for poor business, especially when demand is below normal. Even if you have the best mousetrap, why handicap it by out-of-the-way locations and poor sales and advertising methods?

Building Sewing Machines in Russia

A SIDELIGHT was thrown on the scope of the Russian five-year program the other day, in the shape of a very special drilling machine to handle parts for sewing machines. We are apt to think of the attempt of the Soviets to manufacture machinery for their own needs as being confined to locomotives, tractors, motor trucks, and the like, rather than to such household appliances as sewing machines. The more we learn of the program the more we realize the vision of its instigators and the difficulties that confront them.

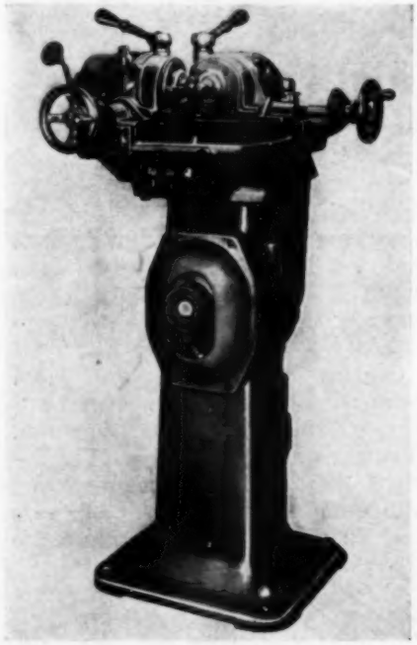
If the outcome is even a partial success, it will be a tremendous achievement for a non-industrial country, one in which tradition and training form no background for the new era. Lack of trained engineers and of operatives for the new machinery is a great handicap, so that success, if it comes, will be all the more remarkable.

Whether the success be complete or only partial, there will be a need for machine tools and other shop equipment for the maintenance of the new plants. And as it is most unlikely that this equipment will be built in Russia for many years, there will be a market for those builders who can best meet the requirements as they arise.

SHOP EQUIPMENT NEWS

Gleason 3-In. Bevel Gear Testing Machine

DESIGNED to test the running qualities of straight and spiral bevel gears of the smaller sizes whose shafts intersect at 90 deg., a 3-in. bevel gear testing machine is now being built by the Gleason Works, Rochester, N. Y. Bevel gears are tested by running them together in pairs or with a reference gear. They are tested to check the cutting machine for correct set-up, determined from the tooth bearing found in the test. Gears are also tested after hardening for both tooth bearing and noise, and to determine if the heat treatment has made changes that must be compensated for in cutting. In case the gears are lapped, the testing machine is used as the final check. On this machine the gears can be tested with or without load as desired. The load can be applied manually by a brake operating on the driven spindle or can be set for a fixed amount.

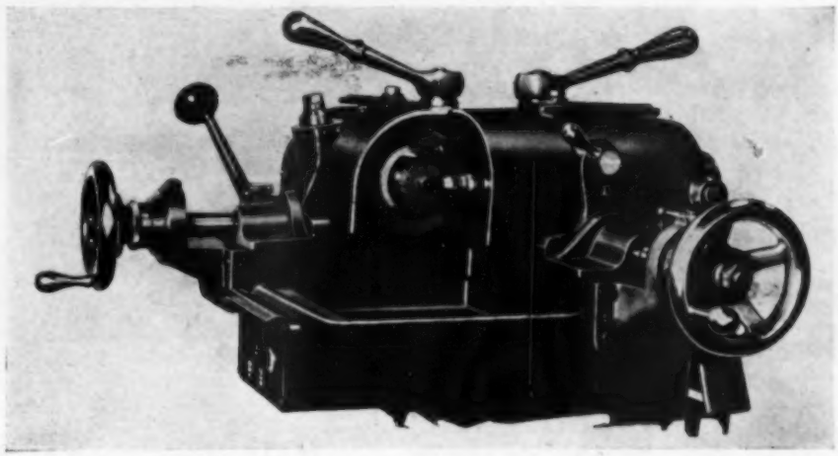


Gleason 3-In. Bevel Gear Testing Machine for either straight or spiral bevel gears of the smaller sizes

Extra precautions have been taken to make this a precision machine. The frame is made of heavy section with ribbing to attain rigidity. Bearing ways on the frame are wide and narrow guides give close alignment. The spindles on which the gears to be tested are placed are carried on matched ball bearings of an improved type, mounted in pairs with sufficient initial load to eliminate all evidence of radial or axial deflection of the spindle under ordinary operating conditions. Seals of labyrinth construction are provided to protect bearings from dirt. Spindle noses are heat-treated and the taper bores are ground with the spindles in place on their own bearings, insuring concentricity between the spindle bearing and the bore.

The drive or pinion spindle is power driven and is operated in either direction by push button control. The spindle is mounted in the pinion head, which is adjustable horizontally on the frame by means of a handwheel and lead screw graduated to 0.001 in. as shown in the illustrations.

The driven or gear spindle is mounted in an eccentric which permits a slight height adjustment, either above or below center with reference to the axis of the drive spindle. With this adjustment the operator can obtain any desired location of bearing on the gear teeth of the gears being tested and also estimate the amount of change required in the settings of the cutting machine to produce this bearing in the correct mounting of the gears. It may also be used to compensate for wear in the ways of the machine. The eccentric can be locked in any desired position by lock bolts. The gear head is adjustable horizontally on the frame at right angles to the pinion spindle by means of a handwheel and lead screw. Both heads are clamped to the frame at front and rear by separate clamps which operate with equal tension from a single lever.



Head of the bevel gear testing machine showing the abrasive guards in place

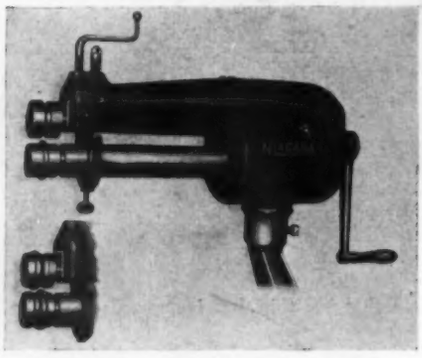
All oil, before reaching the spindle bearings, is filtered through oil cups of an improved design. These cups are provided with sight glasses. A set of guards, shown in one of the accompanying illustrations, is furnished as standard equipment. These guards are used when it is desired to run the gears together with an abrasive. The machine is arranged for a belted motor drive. A ½-hp., 1,500 or 1,800-r.p.m. motor and a reversing push button control are built in.

Specifications: Distance from center of drive spindle to nose of brake spindle, ⅜ in.-3⅞ in.; distance from center of brake spindle to nose of drive spindle ⅜-4⅛ in.; with abrasive guards in place, distance from center of drive spindle to nose of brake spindle ¾-3⅞ in.; distance from center of brake spindle to nose of drive spindle, 1-4⅛ in.; r.p.m. of drive spindle, 3,000 and 4,500; diameter of taper hole, large end, 1.066 in.; taper

per foot, $\frac{1}{2}$ in.; depth of taper, 4 in.; diameter of hole through, $\frac{3}{4}\frac{3}{2}$ in.; drives, V-belt, $\frac{1}{2}$x$1\frac{1}{2}$ in., 51.98 in. long; floor space occupied, 26x26 in., and net weight, 550 lb.

"Niagara" No. 192 Beader

Up to No. 18 gage sheets can be handled on the No. 192 beading machine announced by the Niagara Machine & Tool Works, Buffalo, N. Y. The machine has been designed for the heavier beading operations encountered in blow pipe, ventilator, cotton gin machinery, stack manufacture, and other such operations. The



"Niagara" No. 192 Beader designed for heavy operations in blow pipe, ventilator, and stack manufacture operations

throat is deep so that beads can be rolled a considerable distance from the end of the pipe.

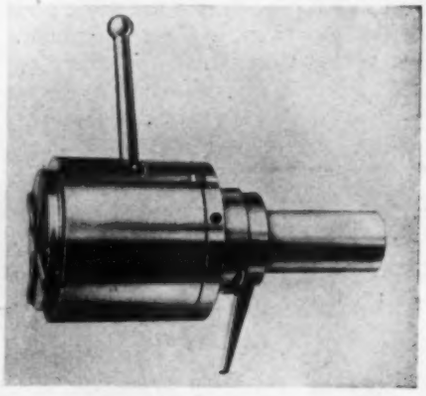
A one-piece frame is employed, entirely inclosing all gears and shafts. A steel horn carries the bronze bearings for the lower shaft, and contains a large oil pocket for complete lubrication of the lower shaft. Upper shaft bearings are large and provision is made for easy and adequate lubrication. A crankscrew raises and lowers the upper shaft to allow the entrance of the piece which is to be beaded.

Rolls of casehardened steel are held in place with countersunk nuts and are flush with the ends of the shafts. A large gage with a polished face slides on the lower horn, and is held in the desired position by a thumbscrew.

The No. 192 beader is furnished with one pair of 1-in. "Ogee" beading rolls, and one pair of $\frac{3}{8}$-in. beading rolls, a large standard, and a wrench for the roll nuts.

"Geometric" Type KL Self-Opening Diehead

Adapted to short threads or threads of fine pitch, the Type KL self-opening diedhead is being placed on the market by The Geometric Tool Company, New Haven, Conn. This diehead is equipped with a lever trip and all stresses from tripping are removed from the chasers and from the threads being cut, thus preventing torn threads. The trip lever is so placed that it will contact with an adjustable stop, which may be easily rigged up for any machine. It is customary to put such a stop on the cross-slides, or in some cases on the bed or frame.



"Geometric" Type KL Self-Opening Diehead of the outside-trip type for stationary use

Contact between the stop and the trip lever causes the head to open at the desired length of thread. It is reset by a conveniently placed handle. The cutters employed are interchangeable with those used on other dieheads of the company's manufacture.

The dieheads are made in straight thread capacities from $\frac{1}{8}$-$\frac{9}{16}$ in. in diameter to $\frac{3}{5}$ in. in diameter, and threading lengths from $2\frac{3}{4}$ to $6\frac{1}{4}$ in., respectively. The sizes range from $\frac{9}{16}$ to 5 in. in diameter.

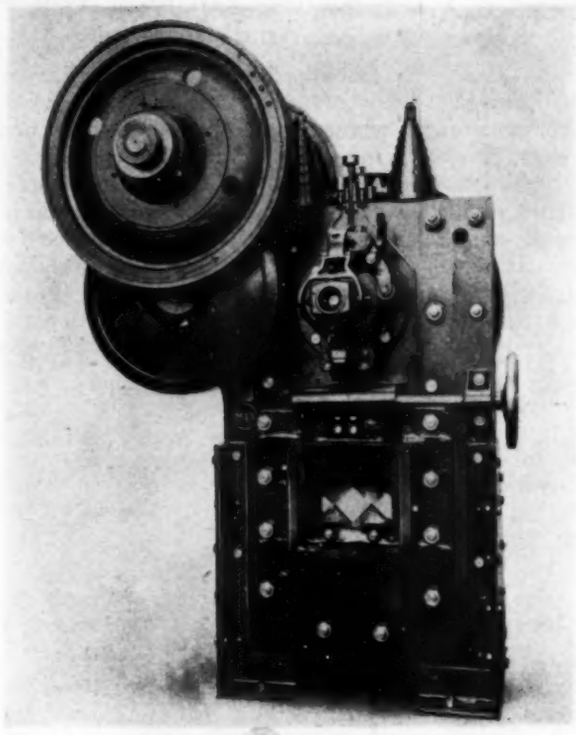
Pels Types FV-35 and FV-42 Bar and Billet Shears

Two comparatively small sizes have been added to the line of heavy-duty bar and billet shears built by Henry Pels & Company, Inc., 90 West St., New York, N. Y. These small sizes, known as the FV-35 and FV-42, have capacities for 4 and $4\frac{1}{2}$ in. rounds, respectively. As in other shears built by the company, the frame is of unbreakable steel plate construction, the two frame plates being connected rigidly by a number of heavy turned bolts. A cast-steel frame around the shear throat provides additional strength, and the lower knife rests on a cast steel bridge, which is supported on both frame plates, and which transmits the pressure of the lower knife equally to both of these frame plates.

Gearing and flywheels are placed overhead to make the machine compact. Twin flywheels are employed to obtain smooth operation. The flywheel shaft runs in a long bearing with automatic ring oilers. All gears have cut teeth; bronze bushings are used throughout.

Specifications of Pels Type FV-35 and FV-42 Bar and Billet Shears

	Size 35	Size 42
Capacities		
Rounds, in	4	$4\frac{1}{4}$
Squares, in	$3\frac{1}{4}$	4
Flats, in	13x$1\frac{3}{4}$ or 8x$1\frac{3}{4}$	14x$1\frac{1}{2}$ or 9x$1\frac{3}{4}$
Strokes per minute	22	22
Length of stroke, in	$3\frac{1}{4}$	$3\frac{1}{2}$
Power required with belt drive, hp	12	15
Speed of flywheel, r.p.m.	375	375
Net weight, approximately, lb	12,100	15,400
Length, in	71	87
Width, in	63	79
Height, in	102	116



Small Pels Bar and Billet Shear available in two sizes to cut 4 and 4½ in. rounds, respectively

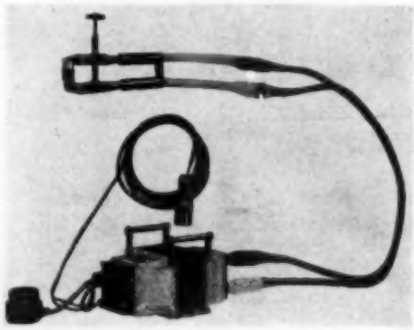
A three-jaw clutch actuates the machine. Operation is ordinarily by means of a hand lever although a foot trip can be provided. The clutch disengages automatically upon completion of each stroke, or can be locked for continuous operation. Backlash is prevented by a special pin, which locks the clutch with the shaft while the cut is being performed. This prevents trouble in cutting very hard steel. A band brake is mounted on the end of the eccentric shaft and stops it automatically in the highest position of the slide.

General Electric Resistance-Type Brazing Equipment

Brazing equipment utilizing the resistance principle has been placed on the market by the General Electric Company, Schenectady, N. Y. Brazing with this equipment is caused by the heat generated by the flow of electricity through carbon blocks. As these blocks offer high resistance, the heat generated is correspondingly high, and small pressure is needed to complete the joint.

The equipment consists of a transformer, foot switch, and tongs for holding the carbon blocks and work. Sizes of various parts depend upon the size of work to be handled and joints to be made. A typical equipment involves a 5-kva. transformer weighing 45 lb. and having a 220-volt primary and an 8-volt secondary. A 10-kva. transformer for heavy-duty service weighs 95 lb. and has the same primary taps, but is equipped with 8-, 10- and 12-volt taps on the secondary. The secondary taps can be readily changed for different sizes of joints, the higher taps being for larger sections.

Parts to be brazed are designed with flat surfaces or are flattened before brazing. After the work is clamped in the tongs, flux is added and the current turned on by pressing the foot switch. When the flux melts, the brazing alloy is held



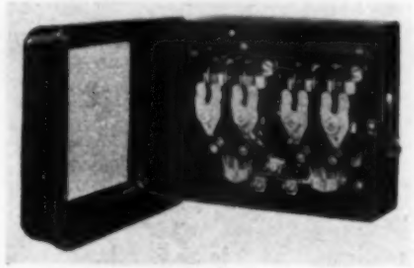
Carbon blocks offer the high resistance to current passage which furnishes brazing heat in the GE Brazing Equipment

against the hot metal until it flows into the joint by capillary attraction. During the process of brazing the hot alloy dissolves a thin film of the metal surfaces, thus forming a new alloy rich in copper and with a higher melting point than the original alloy.

Advantages claimed for this method over soldering include less time, less expense, and greater strength.

Square D Reversing Contactor for Small Motors

A Class 8711 reversing contactor for small motors has been developed by the Square D Company, Industrial Controller Division, Milwaukee, Wis. This contactor is for use primarily in operating controls on small machine tools and is manufactured in two types, one for two-wire control only and the other for two- and three-wire control. The starter may be wired for controlling single-phase,



three- or four-wire reversible motors, or three-phase motors. It consists of two double-pole, double-break contactors mechanically interlocked and mounted side by side on a sheet steel panel in a sheet steel case. The contactor armatures are of the full-floating type and the wiring terminals are conveniently located at the top.

Starters for use with single- and three-phase motors are available in 1½-hp., 110-volt, or 3-hp., 220-volt models. The inclosing case is 8½ in. wide, 6½ in. high and 4¼ in. deep. The net weight is 7½ lb.

Cutler-Hammer Three-Position Pilot Switch

Motor-driven pumps, compressors, and similar machines which are controlled by an automatic pilot device such as a float switch, pressure switch, and time clock, often require some means of starting and stopping the motor manually. For this purpose, Cutler-Hammer, Inc., 2 12th St., Milwaukee, Wis., has developed a three-position pilot switch, of which the operating lever can be placed in either the "automatic," "off" or "manual" positions. When turned to "automatic," the automatic pilot device is in the circuit and normal, auto-

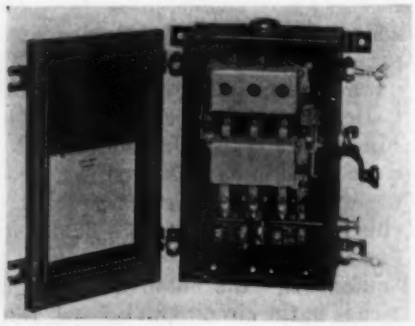
Cutler-Hammer Three-Position Pilot Switch for manual control of motors

matic operation is obtained. Turning the lever to "manual" position closes the control circuit direct and the motor will run continuously regardless of any other control devices as long as voltage is on the line.

The construction is simple. It consists of a two-button, push-button switch inside the case, the buttons of which are operated by a cam attached to the operating lever. The lever will remain as placed in any one of the three positions.

Dust-Tight Inclosures for Square D Automatic Starters

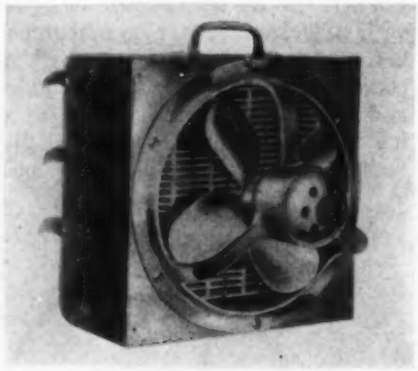
The Industrial Controller Division of the Square D Company, Milwaukee, Wis., has recently put on the market a dust-tight inclosure for across-the-line and combination starters. The illustration shows the Class 8532-S starter with such an inclosure, which has been developed principally for those applications where special protection must be had against excessive dust.



The cabinets are of heavy-gage steel with heavy strap-iron mounting brackets. Cast-iron conduit flanges with live-rubber gaskets are furnished on the top and bottom of the cabinet to insure dust-tight conduit connections. As shown, the door has a deep flange for fitting around the cabinet. Inside the door is a heavy felt gasket fastened by means of metal strips and clamped against the wide cabinet flanges by means of hinged bolts. Two or more straps are provided on the door cover to receive the hinged bolts. For the thermal overload relays, a dust-tight push-button is furnished in the side of the cabinet.

"American" Electric Space Heater

The American Foundry Equipment Company, Mishawaka, Ind., has placed on the market an electric space heater for industrial and commercial heating needs. This unit combines the characteristics of both the steam unit heater and the electric heater. Special alloy heating strips are cast integrally with composite fins of aluminum alloy, making a single smooth casting that will permit an uninterrupted flow of air through its channels. Castings of this type are assembled in suitable number and size into a cabinet, in the back of which a fan operates.

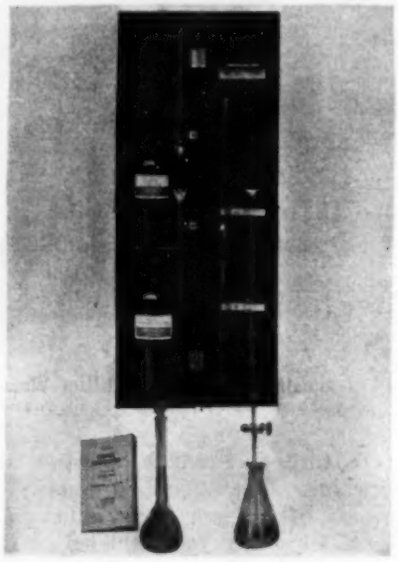


Rear of "American" Electric Space Heater, showing the fan mounting

The heater can be used for permanent installation or as a portable heating unit. It is suitable for plants generating their own power.

Kocour Chromic Acid Analytical Set

Developed to replace the hydrometer because of the latter's inaccuracy, a chromic acid analytical set is now being manufactured by the Kocour Company, Inc., 4,724 So. Turner Ave., Chicago, Ill., for use in determining the amount of chromic acid in solution in plating baths. While a hydrometer records everything dissolved or suspended in a solution, this type of set determines accurately the chromic acid present, regardless of other impurities present, whether in solution or in suspension. The method used is known as permanganate - ferrous sulphate titration, which, ordinarily, is quite complicated because of the necessity of standardizing the solutions. By a procedure which balances out the changing ferrous sulphate solution automatically, however, a direct reading in ounces per gallon of chromic acid is simply and quickly obtained.



The importance of knowing the amount of chromic acid in solution is appreciated readily when it is realized that the metal content is not furnished by soluble anodes as in other plating baths but must be kept up by additions of chromic acid. And also since the amount of sulphate is maintained in proportion to the chromic acid the necessity of knowing this latter factor is recognized.

The set consists of a special burette, two pipettes, two bottles of solution, a volumetric flask, an Erlenmeyer flask, and a direction card, all packed in a lock-corner box which serves as a dust-tight cabinet for the entire set

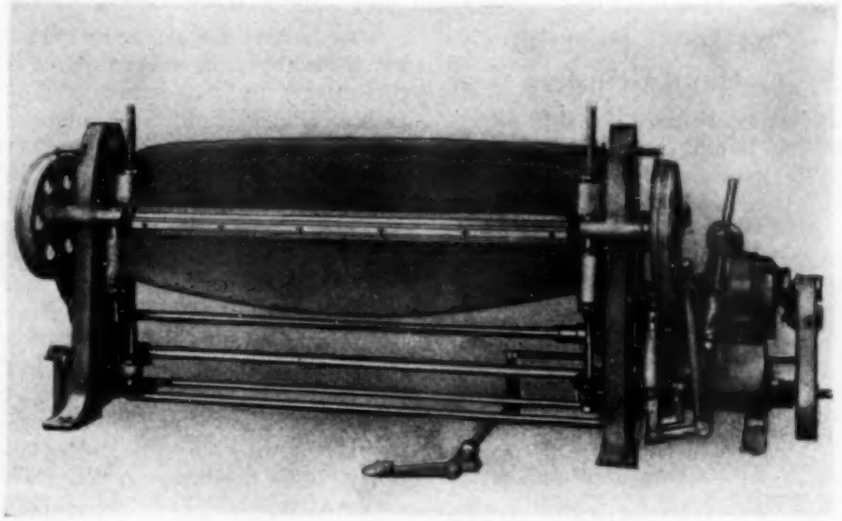
when not in use and as a holder for the burette while making a test. The set reads directly, and is accurate to the one-half ounce of chromic acid per U. S. gallon. No calculations are required. With a few accessory chemicals, the set will also determine trivalent chromium. It can also be made to read in grams per liter or ounces per Imperial gallon.

Schuler Automatic Power Folding Brake

A highly developed folding brake for bending, round-bending, and rolling of cylindrical, slightly conical, and similar tubes has been placed on the market by the Schuler Works, represented in the United States and Canada by J. I. Bernitz, 47 West St., New York City, and 11 Wellington St., E., Toronto 2. The main feature of this type of machine, built in numerous sizes for materials up to $\frac{5}{16}$ in. thick in working lengths up to 13 ft., is fully automatic operation. After placing the sheet against an adjustable gage, the operator starts the machine by foot-treadle. The following operations are performed successively without further attention: clamping of the sheet by the top or clamping leaf; bending of the sheet by the bending leaf; return of the bending leaf to original position; and return of top or clamping leaf to original position, thereby releasing the bent sheet.

The bending leaf can be adjusted to bend uniform angles between 0 and 180 deg. The bending blades rest in longitudinal grooves in the top leaf and can be changed without loosening a single screw. This enables a rapid and easy exchange of blades. The top leaf is protected against overloading through excessive clamping of the sheets by a safety ratchet clutch. The bending leaf is suspended on steel spindles which rotate on steel pivots. This arrangement, together with a similar screw adjustment of the top leaf, gives a wide opening, so that bulky work on boxes with high inside or outside flanges can be handled easily.

For bending completely closed tubes or boxes, the machines can be arranged with a swing-out top leaf. Heavier machines for material up to $\frac{9}{16}$ in. thickness are also made.

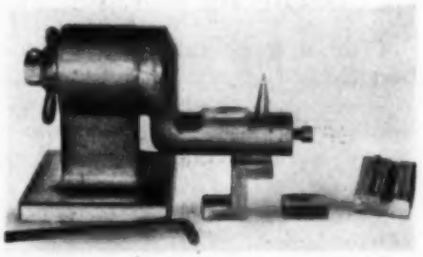


Schuler Automatic Power Folding-Type Brake

Universal Radius Dresser

A device for dressing surface grinding wheels, either convex or concave, for grinding sectional dies, forming dies, punches, models, and tools to various radii has been produced by the Universal Tool & Machine Company, 14 St. Louis Ave., Dayton, Ohio. The device was designed by A. A. Anglemyer. Accurate gage-blocks are used for setting the diamond of this tool in the proper position for dressing any radius desired.

A Z-shaped set-up block mounted on the swivel-arm holds the diamond. It has a checking surface which is marked "On Center" and coincides exactly with the axis of the shaft on the swivel-arm. The diamond is set quickly for any convex radius up to 0.750 in. by using the proper gage-blocks between the Z-set block when clamped to the swivel-arm and the diamond point. After the diamond has been set for the correct radius



Universal Model "O" Radius Dresser with a range of 0.750-in. radius, either convex or concave

the Z-set block is removed and the machine is ready for operation.

For dressing a concave wheel, the 0.500 in. set-up block is mounted between the base of the Z-set block and clamped to the finished flat surface of the swivel-arm. This brings the checking point exactly 0.500 in. past the center of axis with the shaft of the swivel-arm. Any concave radius can be obtained by using a combination of gage-blocks between the diamond point and the Z-set block that equals the difference between 0.500 in. and the desired radius. Larger radii may be had by using a set-up block greater than 0.500 in. in thickness in combination with the Z-set block.

At the extreme right in the illustration is an example of work produced by grinding wheels dressed with this device. Zero and 90 deg. marks are placed on opposite sides of the swivel-arm to show the operator when the diamond has been swung through 180 deg. A feature of this dresser is that it pivots in a horizontal position so that the grinding wheel can be fed down to the diamond the exact amount of the radius to be dressed. Any radius can be dressed without removing the wheel guards. Both sides of the base are machined parallel with the shaft of the swivel-

arm which is convenient to use on a magnetic chuck with a straight-edge.

The swivel-arm pivots on a hardened and ground steel shaft with large thrust surfaces at either end. The bearings are housed so that they are practically dust-proof, and all grinding dust passes in a horizontal path away from the bearings. The Model "O" radius dresser has a range of 0.7550 in. radius, either convex or concave, and will clear a 7-in. grinding wheel.

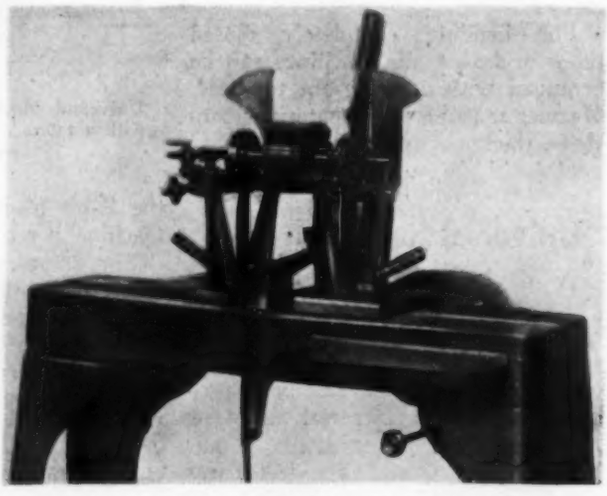
Globe Dynamic Balancing Machine

Claimed to be extremely accurate and as rapid for reading dynamic unbalance as present static methods, the Globe dynamic balancing machine is being marketed by the Globe Tool & Engineering Company, Dayton, Ohio. The value of unbalance in actual values is read directly on the machine and the spot for correction is also located accurately.

One operator reading values can keep two or more others busy making the necessary corrections. The machine is designed with a locking brake so as to speed the taking of readings. The brake is used to hold the armature or part to be balanced securely while weights are being added in the machine, if this is desired.

In operation, special ball bearings suitable to fit the shaft are placed on the part to be balanced, and the assembly is placed in the machine saddles. These saddles are then locked with a simple movement of a knob and the part to be balanced is rotated through an auxiliary driving means by a reversible electric motor plugged into a convenient light socket. First one saddle and then the other is unlocked with the knobs after setting the amplitude indicators and locator stylus to zero. The locator stylus marks the shaft to show the exact point to add the weight to correct the unbalance. This stylus has been built on a new principle, and it has been found to be accurate although simple in construction. The mass of unbalance is read direct on the indicators and the operator then reads from a chart the amount of weight to add or remove at the point indicated on the machine. A foot brake is used to bring the rotating part to a quick stop to increase the speed of taking readings. A skilled operator can easily make a reading in 30 seconds.

The machine is designed to read and locate values as low as five grains, although this is much less than is found necessary for correction in the average production. Size No. 1 will read unbalance in armatures from 2 in. to 7 in. in diameter and in shaft lengths of 30 in. between bearings. The shaft extensions may be 4 ft. over all. No. 0 is for diameters of 2 in.



Head of the Globe Dynamic Balancing Machine. A standard 4-legged base carries the brake pedal

"Hisey" Portable Hand Grinders

Two heavy-duty portable grinders having 1- and 2-hp. capacity respectively have been introduced by The Hisey-Wolf Machine Company, Cincinnati, Ohio, built with ball bearing motors and a Timken roller bearing grinding spindle. The motors are rated for continuous duty and mechanical parts are proportioned for severest service, for either direct or alternating current.

"Hisey" Heavy Duty Portable Grinder available for either lamp socket or power circuit operation

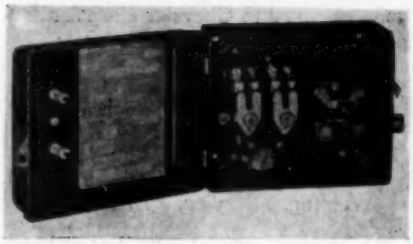
The single-phase a.c. machines can be operated from a lamp socket and are equipped with improved commutating type repulsion induction motors, which unlike the old split phase motors have no dragging centrifugal switch. They will start and pick up speed instantly under any load within twice their rated capacity, according to the manufacturer. Starting current is claimed to be unusually low under all conditions. Utilization of the single-phase motor is also claimed to overcome the low voltage often encountered because of line drop and other conditions.

Standard equipment in every case includes grinding wheel, adjustable and approved steel wheel guard, 10 ft. of rubber cable and connector plug, and a suspension spring. Both the 1 and 2-hp. sizes are available in standard models for 110 volts, single phase, 220 volts, single phase, and 220 volts split phase current. No load speed of the 1-hp. model is 3,400 r.p.m., and that of the 2-hp. model is 1,800 r.p.m. The wheel size of the 1-hp. grinder is 8x1½, and that of the 2-hp. grinder 10x1½. The weight in pounds of the 1-hp. size is 85 without a guard and 90 with a guard and that of the 2-hp. size, 120 without the guard and 127 with it. Overall length of the 1-hp. size is 31 in. and that of the 2-hp. size is 32 in., and the diameter in either case is 8⅝ in.

Square D Class A.C. and D.C. Starters

Two starters for a.c. and d.c. service, respectively, have been placed on the market by the Industrial Controller Division of the Square D Company, Milwaukee, Wis. These starters are designated as the Class 8531 a.c. two-pole and the Class 8731 d.c. two-pole switches for across-the-line starting of small motors. They have silver contact points, a floating contactor armature, and two-pole double break contacts. The overload relay is of the thermal time-limit type with an external reset button in the cover. Low-voltage release is provided with two-wire control and low-voltage protection with three-wire control.

These starters are made in the Type B-1 for two- or three-wire con-



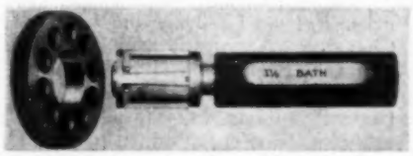
trol and the Type C-1 for two-wire control with a three-point switch in the cover for manual, off, and automatic operation. The a.c. starter is for use with motors up to 1½ hp. at 110 volts and up to 3 hp. at 220 volts. The d.c. starter is for use with motors up to 1 hp., 115 and 230 volts.

The width of the starter is 7¾ in., height, 6¾ in., and depth, 4½ in.

Bath Adjustable Plug Gage

A variation of the Bath internal micrometer, an adjustable plug gage, is now being produced by John Bath & Company, 18 Grafton St., Worcester, Mass. The gage is planned to be substituted for solid plugs where it is not necessary to take a reading on every size but simply to secure long service life.

The feature of the gage is an adjustment for wear by means of mov-

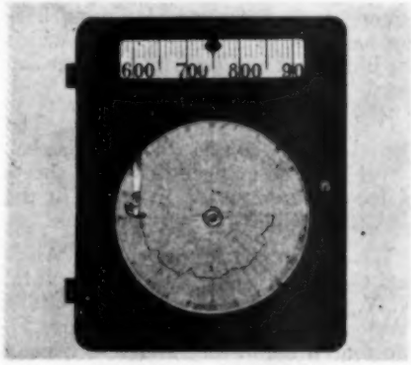


able jaws and a screw in the handle. This adjustment is made quickly and easily by applying a wrench to the screw in the handle and bringing the jaws up to the size of the master ring. A lap is provided with each gage to restore parallelism to worn jaws.

The adjustable plug gage is claimed to have several advantages, including that of telling whether or not a hole is out of round, giving greater economy than with solid plugs, and furnishing a standard reference plug. This gage can also be made in the "progressive type" with both "Go" and "No Go" diameters on a single set of jaws. It is made in sizes from 1 in. to 4 in. in diameter.

Uehling "Self-Contact" Potentiometer Pyrometer

A novel instrument for measuring and recording temperature has been developed by the Uehling Instrument Company, 106 Vesper St., Paterson, N. J. This instrument, known as the "Self-Contact" Potentiometer Pyrometer, was designed primarily for measuring high temperatures as experienced in iron, steel, and ceramic industries. It lends itself equally well, however, to the measuring and recording of any temperatures where a high



degree of accuracy is desired. Either a thermo-couple or an electric resistance bulb may be used as the temperature element.

This pyrometer eliminates entirely the use of depressor bars, cam mechanisms, and continuously operating motors. This is made possible by a patented method which assures contact between the needle of a galvanometer and stationary contact pieces, without employing auxiliary mechanical devices.

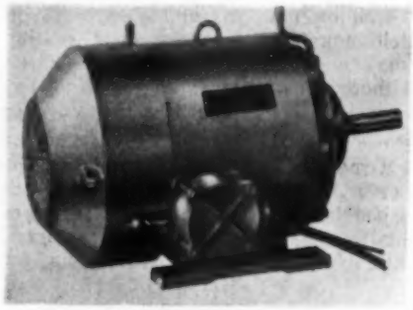
Although this recorder retains all the advantages of the potentiometer, the contact method permits placing the galvanometer apart, and at almost any distance from the recorder. This makes possible a very simple and rugged recorder construction. The recorder is actuated by a galvanometer that may be placed in any desired location. A single galvanometer will actuate as many as four recorders, each recorder in a different location, each measuring a different temperature, and if desired, each having an entirely different calibration.

The entire recording mechanism is fastened to a frame hinged to the case. Everything may, therefore, be opened up to permit accessibility to all parts of the apparatus. A small motor operates only as and when necessary to adjust the pen to the proper temperature reading on a clock-driven chart. It is also geared with two pulleys over which a translucent endless belt is placed. The belt is calibrated in temperature units and will move in direct proportion to the pen mechanism but at a greater speed. This permits a very open and legible scale which moves in back of a pointer fastened to the door. The legibility of the figures, the length of the scale, and the rear illumination make it easily read under all conditions at a distance of 75 ft.

Allis Totally-Enclosed, Fan-Cooled, Squirrel Cage Type J Motor, 3 to 100-hp.

A sealed motor easy to take apart has been produced by the Louis Allis Company, Milwaukee, Wis., known as the Type J, fan-cooled, ball-bearing motor. This is a modification of the Type R motor and utilizes similar methods of enclosing and ventilating. Additional refinements include "cartridge type" bearing chambers, and simple devices for removing the fan, ventilating shell, and heads quickly. As a result, maintenance men can dismantle and reassemble Type J motors in less than five minutes under ordinary conditions.

Type J is a totally-enclosed motor sealed inside a sheet-steel ventilating shell. All enclosing parts are joined by long close fits, all metal-to-metal and at least ⅜ in. wide. All bearing chambers are within the enclosure, thus utilizing the oil seals and fits of the cartridges around the shaft to exclude foreign matter. Cast iron



heads are used with no holes passing from outside to inside. Cap screws holding the heads to the frame pass through holes in lugs projecting outside the head fit. The cast iron heads

are exchangeable end for end. No pipe connections or air ducts are required. The back bearing may be inspected without disturbing the fan guard, fan, front head, or rotor. A socket wrench is claimed to be the only tool required and the time is said to be three minutes or less.

TRADE PUBLICATIONS

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ROLLER BEARINGS. The Hyatt Roller Bearing Co., of Harrison, N. J., has issued Bulletin Q entitled "The Application of Hyatt Roller Bearings to Pulp and Paper Machinery."

TRAMRAIL SYSTEM. The Cleveland Electric Tramrail Division of The Cleveland Crane & Engineering Co., Wickliffe, Ohio, has issued a bulletin entitled "Do Not Build More Ovens" illustrating Cleveland Tramrail Rack Carriers, and listing the Tramrail engineers in various sections of the country.

DIRECT CURRENT MOTORS. General Electric Co., Schenectady, N. Y., has issued Bulletin GEA-1294 on "Type MPC Direct-Current Motors with Base and Pedestal-Bearing Construction for Moderate or Heavy Duty."

LUBRICATING DEVICES. The Borne Scrymser Co., 17 Battery Place, New York City, has recently issued two pamphlets entitled "The Borne's Universal Compressor for Oil or Grease" and "Are You Still Groping in the Dark?" which illustrates the Borne Universal Lubricators.

PROTECTIVE COATING. The Irvington Varnish & Insulator Co., Irvington, N. J., has issued a 60-page booklet entitled "The Story of Harvel, the New Protective Coating." A number of illustrations of the increasing use of this company's product are shown.

CHAIN BELT CONVEYOR FURNACE. An 8-page bulletin with 16 illustrations, describing new gas and electric Chain Belt conveyor furnaces, heat-treating small and miscellaneous size products without pans or trays of any kind, has been issued by The Electric Furnace Co., Salem, Ohio.

TOTALLY-ENCLOSED MOTORS. The Louis Allis Co., Milwaukee, Wis., has issued bulletin 510 on a new series of totally-enclosed, fan-cooled, squirrel-cage motors, type J, of 3 to 100 hp.

OIL AND GAS-FIRED FURNACES. An 8-page bulletin, illustrating oil and gas-fired continuous and batch-type billet heating, forging, and car-type furnaces for heating, normalizing, and heat treating, and also illustrating material-handling equipment, has been issued by the Electric Furnace Company, Salem, Ohio.

WELDING ELECTRODES. Alloy Welding Processes, Ltd., Ferry Lane Works, Forest Road, London, E.17, England, has issued a bulletin No. 60 on "A.W.P." special alloying electrodes for the welding of corrosion and heat-resisting steels and alloys. Eleven such special electrodes are listed.

"PROBLEMS OF THE METAL INDUSTRY." The Engineering Devices Co., Inc., 545 Fifth Ave., New York, N. Y., has issued a book entitled "Problems of the Metal Industry and their Solution by the Inventions of Professor M. Schlotter" which is devoted principally to plating operations.

TOOLS. The Ready Tool Co., Bridgeport, Conn., has issued catalog No. 23 showing ball bearing centers, high-speed centers, toolholders, grinder dogs, boring bars and other items, all of which are illustrated and described. Sizes are listed.

DISK CLUTCH DATA SHEETS. The Twin Disc Clutch Co., Racine, Wis., has issued several engineering data sheets of loose-leaf form for inclusion in the booklet provided for previous sheets.

WELDING. The Automatic Arc Welding Co., 11 W. 42nd St., New York, N. Y., has available a booklet entitled "Automatic Arc Welding" by Harry D. Morton on the history and principles of arc welding.

U. S. DEPARTMENT OF COMMERCE BULLETINS. The Bureau of Standards of the U. S. Department of Commerce, has issued two new bulletins reprinted from the Bureau of Standards Journal of Research and issued under the numbers of Research Paper No. 185 and No. 188. Research Paper No. 185, by S. N. Petrenko, is entitled "Relationships Between Rockwell and Brinell Numbers," and Research Paper No. 188, by Ronald Bulkley and F. G. Bitner, is entitled "A New Consistometer and its Application to Greases and to Oils at Low Temperature." Either bulletin may be obtained from the Superintendent of Documents, Washington, D. C.

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PATENTS

August 12, 1930

Metal Working Machinery

Burring Machine. Frederick J. Schumacher, Los Angeles, Calif. *Patent 1,772,500.*

Method and Apparatus for Die Rolling. William H. Donner, Buffalo, N. Y. *Patent 1,772,538.*

Quenching Press. Leon D. Slade, Rochester, N. Y., assigned to Gleason Works. *Patent 1,772,576.*

Grinding Machine. Sidney S. Probert and Frederick J. Lamborn, Detroit, Mich., assigned to Chrysler Corporation. *Patent 1,772,592.*

Press for Forging or Shaping Metal. John E. Dobson, Cleveland, Ohio, assigned to The Cleveland Punch & Shear Works Company. *Patent 1,772,599.*

Rail-Grinding Machine. Frederick L. Re Qua, San Francisco, Calif., assigned to Welding Service, Inc. *Patent 1,772,636.*

Grinding Machine for Finishing Borings. Karl Jung, Berlin, Germany. *Patent 1,772,721.*

Broaching Machine. Charles W. Eggenweiler and William J. Fiegel, Detroit, Mich., assigned to Bohn Aluminum & Brass Corporation. *Patent 1,772,801.*

Grinding Machinery. Sol Einstein, Cincinnati, Ohio, assigned to Cincinnati Grinders Incorporated. *Patent 1,772,932.*

Automatic Turning Machine. George F. Yager, Toledo, Ohio, assigned to The Bunting Brass & Bronze Company. *Patent 1,773,085.*

Tools and Attachments

Truing Device for Abrasive Wheels Used in Producing Ground Articles. Lewis R. Heim, Mount Dora, Fla., assigned to Cincinnati Grinders Incorporated. *Patent 1,772,544.*

Method of Hobbing Tapered Gears. Allan H. Candee, Rochester, N. Y., assigned to Gleason Works. *Patent 1,772,585.*

Sizing, Coining, or Squeezing Attachment for Power Presses. Neal W. Dorman, Toledo, Ohio, assigned to The Toledo Machine & Tool Company. *Patent 1,772,600.*

Hob, and Hob for Cutting Roller-Chain Sprockets. Carl G. Olson, Chicago, Ill., assigned to Illinois Tool Works. *Patents 1,772,634 and 1,772,635.*

Charging Apparatus for Cupolas. Maurice F. Beetham, assigned to Whiting Corporation. *Patent 1,772,884.*

Cutter. Johan Oscar Lifflander, Stockholm, Sweden, assigned to J. & C. G. Bolinders Mekaniska Verkstads Aktiebolag, Stockholm, Sweden. *Patent 1,772,905.*

Combination Tool. Louis Wernicke, West Bend, Wis. *Patent 1,772,925.*

Lathe-Driven Tailstock Feed. Emil G. Forsberg, Coalinga, Calif. *Patent 1,772,940.*

Chuck. Tiedman M. Lilleberg, Chicago, Ill., assigned to The Nye Tool & Machine Works. *Patent 1,772,953.*

Garage Press. Robert E. Manley, York, Pa., assigned to Manley Manufacturing Company. *Patent 1,772,954.*

Chuck. Gustaf A. Englund, West Hartford, Conn., assigned to The Jacobs Manufacturing Company. *Patent 1,773,034.*

Furnaces

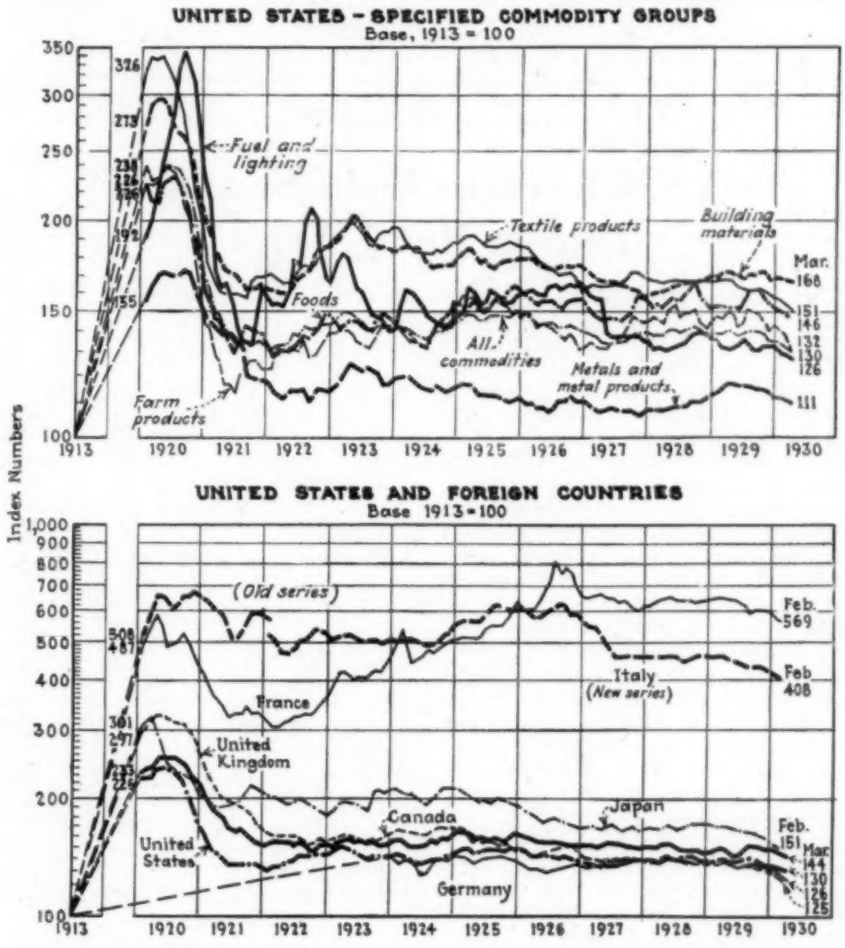
Inductor-Type Furnace. Edwin Fitch Northrup, Princeton, N. J., assigned to Ajax Electrothermic Corporation. *Patent 1,772,579.*

NEWS OF THE WEEK

Metal Product Prices Shown Lowest in Study of Price Trends

WHOLESALE prices of metals and metal products have remained considerably below those for other commodity groups since 1920, according to a study on the trend of wholesale prices completed recently by the National Industrial Conference Board. The initial year of the chart, 1920, shows all commodities at the highest point which they have attained in recent years. In the latter part of the year, prices fell rapidly and reached on the average their lowest point at the beginning of 1922. Some recovery followed, and the early part of 1923 showed the highest index since the drop from the peak of 1920. From 1923 to the present time, prices have fluctuated within a comparatively narrow range. The most recent movement, beginning in the latter part of 1929, brought the prices of commodities in March, 1930, to a point below the minimum in 1922. Of all commodity groups, fuel and light have shown the greatest variability.

Among the nations compared in the lower portion of the diagram, the United States suffered less than any other from currency inflation as a result of the war, and in consequence its level of prices relative to 1913 is generally lower than for other countries. Prices in the United Kingdom gradually approached the United States level, and in the last few years have been almost identical with it. Figures for France and Italy reflect in the price level the depreciation of the monetary standard and until recent years also the uncertainty of a varying monetary standard. That wholesale prices may be considered as world phenomena rather than national ones is shown in the similarity of price movements since the middle of 1927.



Several Standards Adopted by A.S.A.

Twenty-nine prints containing proposed American standards for spindle noses and chucks are being circulated for review and criticism by the American Standards Association. Proposed standards for annular ball bearings of the single-row type (light, medium, and heavy series) and for ball and roller bearings of the wide type, have been approved as American Standard and American Recommended Practice, respectively.

The standard for milling cutters has been approved. Copies of the proposed Standard for twist drill sizes and lengths have been circularized for review and criticism. The standard on slotted head proportions has just been approved as has the standard for cut and ground thread taps.

According to a statement of the German National Standardizing Body (Deutscher Normenauffchuss) 4,121 standards have been finally approved by the national body up to Dec. 2, 1929, and 1,291 projects were in course of development on that date.

The 1930 issue of American Standards Year Book has just been published by the American Standards Association. The book is similar in form to previous A.S.A. Year Books.

Copies of Simplified Practice Recommendations R51-29 on Die-Head Chasers (for Self-Opening and Adjustable Die Heads) are being distributed by the Simplified Practice Division of the Department of Commerce.

Railway Tool Foremen To Meet in Chicago

Beginning Sept. 10, the American Railway Tool Foremen's Association is to hold its annual convention in Chicago for three days at the Hotel Sherman. Some of the speakers on the program are: H. N. Anderson, the Acme Machinery Co., who will speak on "Forging Machine Dies;" H. Guilbert, director of public safety, the Pullman Co., on "Safety First;" Alexander H. d'Arcambal, of the Pratt & Whitney Co., on "Heat-Treatment of Steel;" and O. A. Garber, chief mechanical officer, Missouri Pacific Railroad, who will make the opening address.

Several standing committees are to report, the subjects covered being: Tools and Methods for Mass Production, Tools for Maintaining Automotive Equipment, and Testing Devices for Pneumatic Tools and Jacks. There is also to be presented a report of the Standardization Committee. A. A. Ferguson, tool supervisor, Missouri Pacific Railroad, and president of the association, will also address the group.

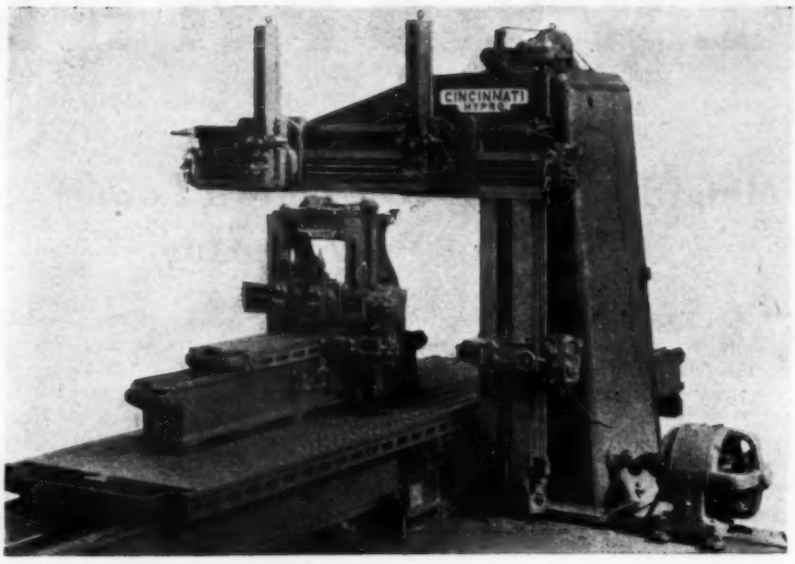
Metals Program Announced For Safety Congress

The program of the Metals Section during the 19th annual Safety Congress in Pittsburgh from Sept. 29 to Oct. 3 has been announced recently by the committee. The session will begin on Tuesday morning, Sept. 30, with a report of officers and committee chairmen to be followed by "Metals Section Accident Statistics" and an "Analysis of the Causes of Accidents in the Metals Industry." The following morning the report of the Nominating Committee will be presented and the election of officers will be held. Three papers will be presented, including "The Foreman as a Safety Factor in Production," "Safety in the Erection of Steel," and "The Machine Age and its Relation to Accident Prevention." A Foundry Session will be held Wednesday afternoon with F. G. Bennett, safety director of The Buckeye Steel Castings Co., as chairman. Papers on "Foundry Engineering and Safety," "Personal Protective Devices for the Foundry Worker," and a "Round Table Discussion of Foundry Hazards," will be presented. On Thursday afternoon the Metals Section Trophies will be awarded, a report of the Safe Practices Committee will be presented, and several roundtable discussions, films, and a playlet will complete the program of the meeting.

Industrial Engineers Announce Convention

The Society of Industrial Engineers recently announced the program for the 17th National Convention to be held Oct. 15, 16, and 17 at the Mayflower Hotel, Washington, with the general theme "Industrial America." The subject of the opening session on Wednesday morning will be "Co-Ordinating Industrial America's Metals, Machines, and Men." A luncheon conference will be held at noon by the Educational Committee with the general subject "The Status of Industrial Engineering in College Curricula." The afternoon will be devoted to motor trips to points of interest. The annual dinner meeting of the Gilbreth International Committee on Fatigue will be held early that evening and a general session on the subject "Stabilizing Industrial America's Purchasing Power" later.

Thursday's program will include such subjects as "How the Federal Government is Organized Profitably to Help 'Industrial America'", "Present Status of Plant Maintenance," and also a meeting of the Board of Directors, the election of officers, and further motor trips. The annual dinner meeting will be held on Thursday evening, at which time the "Harrington Emerson Trophy" will be presented. Friday's programs will be along similar lines. A schedule of visits has been planned for Saturday and Sunday.



Planer and PLANER

With a capacity of 96 in. under the rail and a left-hand head that will square down a casting 125 in. wide, this new 96x96-in. Cincinnati Hypro openside planer has just been completed. A 36-in. planer on its table offers a striking comparison

A.S.M.E. Plans Eight Sessions During Metal Week

DURING "Metal Week," in Chicago from Sept. 22 to 27 at the time of the Metal Congress, the Machine Shop Practice and Iron & Steel Division of the American Society of Mechanical Engineers will sponsor eight technical sessions, all of which will be held at the Hotel Stevens. These will constitute a national meeting of the two divisions and will include a dinner with the Chicago Section on Wednesday evening, Sept. 24. The program is coordinated with that of the American Society for Steel Treating, the American Welding Society, and the American Institute of Mining & Metallurgical Engineers. More than 30 sessions in all will be held. The program of the divisions will open on Tuesday afternoon with a discussion on welding of phenol materials. A paper will be presented by L. V. Quigley of the Bakelite Co., on the engineering practice involved in replacing metals by plastics. A second paper will be presented by A. M. Lynn, of the Western Electric Co., who will discuss "Production of Plastic Parts." The Machine Tool Motor Session will be held on Tuesday evening at which Herbert Chase, associate editor of *American Machinist*, will present a paper on "Flange Type Motor Mountings," and J. L. Browne of the Westinghouse Electric & Manufacturing Co., will present a paper on "The Mechanical Design of Electric Motors as Regards Standardization and Interchangeability."

On Wednesday morning will be held a Polishing and Repairing Session at which Robert T. Kent of the Devine Brothers Co., will present a paper on "Automatic Polishing" and T. P. Thomas of the Westinghouse Electric & Manufacturing Co., will present a paper on "Repair of Worn Parts by Electrodeposition of Iron." The Nitriding Session will be held that afternoon at which R. Sergeson and M. M. Clark of the Metallurgical Department of the Central Alloy Steel Co., will present a paper "Nitriding Analyses — Their Physical Properties and Adaptability" and Dr. Victor O. Homerberg and Dr. J. P. Walsted of the Massachusetts Institute of Technology will present a paper on "Case-Hardening with Ammonia Gas."

Iron and Steel Sessions will be held on Thursday morning and afternoon at which the report of the Heavy-Duty Anti-Friction Bearings Committee and a paper on "The Manufacture of Large Weldless Forged Steel Pressure Vessels" will be presented, in addition to three others. Three papers will be presented at a Furnace Session on Friday morning, and two papers at a Combustion Session on Friday afternoon.

A.S.S.T. Adds to Program For Metal Congress

Several papers have been added to the program which will be presented before members of the American Society for Steel Treating at the Hotel Stevens in Chicago during the National Metal Congress. Edgar C. Bain, research laboratory of the U. S. Steel Corporation, will discuss the nature of nickel-chromium stainless steels in a paper which he

wrote with Robert H. Aborn. This paper will be presented during the session on stainless steels on Thursday morning, Sept. 25. C. H. Bierbaum, vice-president and construction engineer of the Lumen Bearing Co., Buffalo, will describe a new micro hardness tester which he uses to show the comparative hardness of the micro-constituents of metals.

Shrinking Trade Exchanges Worry French Industry

By Our Paris Correspondent

THE French economic situation as expressed by the price index indicates that if world relations are in an unsatisfactory posture those of purely national purport are even more so. Imports show a drop in their price index of 36 points, while nationally manufactured products show an index which has been reduced but 13 points. Retail prices in the Paris district are, moreover, on the rise.

This condition will lead to increasing export difficulties on one hand and the freer entry of foreign products into France on the other. Two fundamentals of the new French regime are here attacked on full flank.

Exports for the first four months show some startling changes. With the exception of agricultural machinery and implements, almost all exports of tools and machinery are fast declining in volume and value. Automobile exports fell off a thousand units a month. Imports of like goods nearly doubled in value, even tripled as compared with the figures of two years ago.

France still sees German machinery and tools of the more elementary sorts encroaching upon the North African market. The items running to the biggest bulk and value are metal-working tools and machinery, hoisting appliances, and conveying machinery, all appreciable elements of the new trade which France has been building up for herself since the war.

Some concern is manifested over reported wage reductions in the Belgian and the recent German transformation of the metal trades and the effect that this is bound to have on sale prices of products exported to France. French wages are generally believed as not being possible of further compression, indeed the continued labor shortage argues against this.

With the proposed German reduction of 7½ to 10 per cent affecting 200,000 workers, German exports will at least show a selling price which will benefit by just that much in so far as the labor factor enters into production costs. The matter is one of anticipation as yet, but its approach is imminent and it will affect both nationally produced French products and machinery and tools from America.

American machine tools at the just-closed Paris Merchandise Fair were seen in as great a force as ever, with actually some newcomers in minor lines. Chiefly, the American exhibits were lost in the crowd so far as their nationality went, in that they were displayed by a score of factors and representatives, often in connection with similar goods from other countries. Germany, of all foreign exhibitors, played up nationality. Great Britain rather less so, while the "Unis-France" device of the "Made in France" group was naturally in the forefront.

Like American automobiles in the annual French Auto Salon, American machinery and tools at the Paris Fair depended upon their individual patronymics—Cincinnati, Milwaukee, Cleveland—rather than on any collectivist American pedigree, a trade magnet worth much and one which is too often neglected.

The index of French industrial production (100—1913) is favorable at 144 as of January last, as compared with 127 for last year. Nevertheless, freight car loadings have, since January, been steadily falling off, reaching a 20 per cent drop during the past few weeks.

Taxation is still the brake which is throttling French industry. One big chemical manufacturing plant paying dividends to the extent of 44 million francs actually paid government taxes amounting to 43 million francs, and the illustration might as well apply in the same proportions to any other industry. This recalls Monsieur Citroen's acute observation of a year or more ago to the effect that his 25,000-franc automobile was actually carrying a taxation load of between seven and eight thousand francs, the consumer paying, of course.

If it means additional machine tool equipment for French industry to bring it up to efficiency it is well to remember that American makers have, for the last two years, found France their second best customer in Europe, in 1929 to the extent of nearly 160,000,000 francs. It is hardly possible that tariff reprisals can affect this, but the tariff situation will certainly give Germany a greater chance in the French market than it now has, above all if any such things as Monsieur Briand's economic entente in Europe does get beyond the embryonic stage. We may doubt that it is especially aimed at the United States, but it is precisely the United States that will be hit if it becomes operative.

BUSINESS ITEMS

The Simonds Saw & Steel Co., Fitchburg, Mass., has purchased a large tract of land located in the easterly section of Fitchburg, along the line of the Boston & Maine Railroad, upon which will be built what is claimed to be the largest saw factory in the world. The new factory, it is estimated, will cost about $1,500,000, and the two factories at present occupied will be vacated as soon as the new manufacturing group is completed. The new plant is expected to be ready on June 1, 1931, and at that time the present manufacturing plant and the file works will be vacated.

The Haynes Stellite Co., Kokomo, Ind., a unit of the Union Carbide & Carbon Corporation, New York City, has announced the completion of a new foundry at the Kokomo Works, built expressly for the manufacture of the Hastelloys, a group of acid-resistant alloys. The general offices of the company are in Kokomo.

The Greene Electric Furnace Co., 1918 First Ave., Seattle, Wash., has been incorporated by Albert E. Greene and associates.

Beebe Bros. Hand Hoist Co. has purchased the former Simmons Saw Co. factory at Sixth Ave. South & Lander St., Seattle, Wash., according to an announcement by R. H. Beebe.

The Liberty Tool & Gage Works, Providence, Rhode Island, has opened a branch sales office in New York City at 30 Church St., under the management of L. B. Godfrey.

The Galloway Co., Waterloo, Iowa, has elected Dante M. Pierce, Des Moines, Iowa, vice-president and director, succeeding A. T. Cole, Des Moines. Other officers were re-elected as follows: C. E. Butler, president; J. W. Henderson, secretary; and E. H. Headford, treasurer.

The Barrett-Cravens Co., 1328-1342 W. Monroe St., Chicago, Ill., will move into its new plant at 101 West 87th St., Chicago on Sept. 1. This move places the Barrett-Cravens Company under the same roof with its two affiliated companies, the Walker Vehicle Company and the Automatic Transportation Co.

The Carborundum Co., Niagara Falls, N. Y., has taken over the two sandpaper and abrasive plants of the American Glue Co., at a cost of $2,439,920. The Canadian plant of the Glue company at Brantford, Ont., will supply the Canadian trade of the Carborundum Co., according to Frank J. Tone, president of the latter corporation.

The American Brass Co., 25 Broadway, New York will occupy Space No.

92 in the Welding Section of the National Metal Exposition. The exhibit will include a complete line of copper and copper-alloy welding rods, Tobin Bronze, and Everdur Rods. In addition, various cast iron parts which have been welded with bronze filler rods will be on display. In attendance are A. M. Dinkler, W. C. Swift, W. H. Dowd, C. D. Pillsbury, J. P. Hocking, F. W. Hackett, F. E. Hill, I. C. Ralph, and H. G. Wallis.

The Parker Metal Decorating Co., Howard & Ostend Sts., Baltimore, Md., has taken about 20,000 sq.ft. of space in a building at Paca and Cross Sts., into which it will move its metal specialties department, retaining the old building for the manufacture of tin cans.

The Spencer Turbine Co., Hartford, Conn., will exhibit a new 5-hp., stainless steel, turbo-compressor at booth No. 75 at the National Metal Exposition in Chicago. F. A. Wright will be in charge of the exhibit and A. W. Peard, western manager, and R. A. Brackett will also be in attendance.

Reorganization of the Illinois Iron & Bolt Co., Carpentersville, Ill., and its subsidiaries, the Star Manufacturing Co., and the Chanson division, has been effected. Howard C. McNeil, Elgin, is the new president, succeeding John F. Fierke, pioneer executive, who has retired from active duties. He was elected chairman of the board, a newly created post. H. A. Rice is first vice-president; Edward C. Masters, secretary; Russell W. Griffith, treasurer; and Paul W. Rauschert, assistant secretary. A. L. Warner, Elgin, is general superintendent and C. A. Portman, for 10 years general manager for the Oliver Plow Co., South Bend, Ind. has been recently appointed general manager.

D. R. Holmes, 805 E. Fayette St., Baltimore, Md., engaged in nickel, silver, brass, and copper plating, has taken over an additional floor in the building, which will be used for a plant expansion.

The Bodine Ice Machine Co., Springfield, Mo., has taken over the Springfield plant of the United Iron Works.

The Patapsco Drydock Co., foot of Andrae St., Baltimore, Md., is constructing a ship repair plant. Robert B. Wathen is president.

The Coast Range Steel Co., Ltd., which was announced in the July 31 issue of *American Machinist* to be planning construction of a $23,000,000 steel plant near Vancouver, B. C., includes the following men among its directors: William B. Mayo, chief engineer of the Ford Motor Co., Detroit, as president; George M. Holly, owner of the Holly Carburetor Co.; William B. Metzger, manufacturer; General C. W. Harrah, all of Detroit, Mich., as vice-presidents.

The Garfield Tool & Die Co., Garfield, Mahoning County, Ohio, will be moved into Salem, Ohio, according to a recent announcement. The plant is conducting negotiations for the property of the Salem Rubber Co., and has been in existence slightly over a year.

The Vulcan Plow Co., Evansville, Ind.; the Roderick Lean Co., Mansfield, Ohio; the Roderick Lean Co. of Indiana, Inc., Evansville; the Hayes Pump & Planter Co., Galva, Ill., and the Peoria (Ill.) Drill & Seeder Co., have merged into a $4,000,000 corporation to be known as Farm Tools, Inc., according to an announcement by Richard Rosencranz, president of the Vulcan company. The subsidiary firms will retain their present plants but will operate as divisions of the new organization. Registered offices will be at Evansville, with accounting operations at Mansfield.

The Reynolite Division of the Reynolds Spring Co., Jackson, Mich., became the wholly owned subsidiary of Cutler-Hammer, Inc., 12th and St. Paul Aves., Milwaukee, Wis., on Aug. 1. This transaction brings into the Cutler-Hammer line the entire group of Reynolite products.

The Selas Co., 1612 Market St., Philadelphia, Pa., has begun installation of machinery in a recently purchased plant at 18th St. and Indiana Ave., Philadelphia. The new building will house office and plant.

The Wright-Tuttle Aircraft Motors Corporation, Anderson, Ind., has filed papers of reorganization with the secretary of state changing the name to the Powercraft Motors Corporation.

The Industrial Plants Corporation, 25 Church St., New York City, has been appointed auctioneer to sell at public auction all machinery, materials, etc. of the Vonnegut Machinery Co., 25 West South St., Indianapolis, Indiana's oldest and largest machinery company.

The Hoth Hay Mower Co., which moved its plant and offices from Postville, Iowa, to Chippewa Falls, Wis., several months ago, is installing new equipment.

The American Fork & Hoe Co., with headquarters at Cleveland, Ohio, will be the nucleus of a $20,000,000 merger of small farm implement manufacturers with plants scattered over a wide territory in this country and Canada. Companies included in the merger are the Kelley Axe & Tool Co., Charleston, W. Va., with three plants in the South, and the Skelton Shovel Co., Dunkirk, N. Y., which also has a plant in Canada.

The R. F. Lamar Co., Pueblo, Colo., has completed a machine shop and factory in the old Hydro-Stone Bldg. at the intersection of Ninth St. & Erie Ave. Actual production work is now being started. The complete equipment of the Iron City Machine Works at Pueblo has been purchased by Lamar and is being moved to the new location.

PERSONALS

James B. Armstrong, 1 E. 42nd St., New York City, has been appointed sales representative for the Reading (Pa.) Steel Castings Co. Mr. Armstrong also represents the Lebanon Drop Forge Co. and other organizations.

George W. W. Cornman, treasurer and manager of the service department, Brown Instrument Co., Philadelphia, retired on Aug. 8. R. C. Kennan was appointed manager, and E. T. Nahill, field supervisor of the department.

F. J. Condit has been appointed resident engineer with offices in Buffalo, N. Y., by the Hevi Duty Electric Co., Milwaukee, Wis. Mr. Condit was formerly in the general offices at Milwaukee.

Fred W. Doolittle, vice-president, director, and member of the executive committee of the North American Co., has been elected president of the Princeton Engineering Association, Princeton University.

Samuel Epstein resigned recently as research metallurgist of the Illinois Steel Co., Chicago, to become metallurgist at the Battelle Memorial Institute, Columbus, Ohio, in charge of research on the embrittlement of steel.

Abbot A. Lane, formerly mechanical engineer with Stevens & Wood, New York City, is now affiliated with Allied Engineers, Inc., New York City.

Dr. C. H. Lorig, professor of mechanical engineering in charge of metallurgical courses, Drexel Institute, has become affiliated with the technical staff of the Battelle Memorial Institute, Columbus, Ohio, where he will study foundry and general metallurgical problems.

A. W. Machlet, president of the American Gas Furnace Co., Elizabeth, N. J., is expected to return late in September from a trip to Europe.

A. F. Murphey has been appointed works manager of the Zanesville division of the American Rolling Mill Co., Middletown, Ohio. A newly created works unit is to be operated with three other manufacturing divisions at Ashland, Ky., Middletown, Ohio, and Butler, Pa. Mr. Murphey joined the company in 1906, became superintendent of the Zanesville plant in 1910, and has been plant manager since 1922.

Neil Otey, formerly of the main office of Poole Engineering & Machine Co., Baltimore, has been appointed Pittsburgh district office manager.

N. Periere, European railroad magnate and director of a number of large transportation companies in the south of France and Spain, arived in Quebec recently on a tour of inspection of Canadian railroads and their methods. Mr. Periere expects to acquire valuable hints as to the various new appliances and operating methods in the Dominion which might be applicable to his own roads in Europe.

R. H. Pratt has been appointed assistant general manager of the American

Steel & Wire Co., 30 Church St., New York, to succeed Richard Foster. He was previously in charge of the flat wire and spring department and has been associated with the company about 30 years.

J. S. Sprott, former manager of sales, Berger Manufacturing Co., is to be affiliated with the Lyon Metal Products, Inc., Auroro, Ill., in charge of sales of the new division, which will market products to be announced soon.

Norman B. Wood, Madison, Wis., has become production manager of the Metal Ware Corporation, Two Rivers, Wis. Mr. Wood was formerly associated with the French Battery Co., and the Automobile Radio Corporation at Madison.

H. Le Roy Replogle, for many years in the steel trade at Johnstown, N. Y., has joined the Boston office of the Warren Foundry & Pipe Co.

Victor Stobie, member of the Institute of British Foundrymen since 1912, and president of the Newcastle, England, branch of the society in 1927-8, has been elected junior vice-president of the institute.

E. B. Terryberry has resigned as Woodstock, Ont., branch manager of the Massey-Harris Co. Ltd., and will retire on Sept. 1 after 40 years with the company.

Fred T. Whiting has been appointed assistant manager of the northwestern district, Westinghouse Electric & Manufacturing Co., under N. G. Symonds, commercial vice-president.

J. C. Ten Eyck, Jr., has been appointed eastern district sales manager for the W. F. & John Barnes Co., Rockford, Ill., and the John S. Barnes Corporation. Mr. Ten Eyck will be located at 7 E. 42nd St., New York City.

Carew Sheldon, formerly with the commercial engineering department, Westinghouse Lamp Co., Bloomfield, N. J., now is with the Nesbitt Electric Manufacturing Co. Ltd., Toronto, Ont.

J. E. Manchester has been appointed in charge of sales for the Machine Tool & Supply Co., Tulsa, Okla., to succeed Jack Hammond.

OBITUARIES

Ira N. Hollis, 74, former president of Worcester Polytechnic Institute and president of the A.S.M.E. in 1917, died on Aug. 14 at his home in Cambridge, Mass. Dr. Hollis was graduated from the U. S. Naval Academy in 1878 and served as an engineer in the Navy until 1893.

S. Frank Wood, president and general manager of the Hobbs Manufacturing Co. Ltd., and president and managing director of the Hobbs Hardware Co., Ltd., of London, Ont., was accidently killed at his summer estate near London on Aug. 4.

Frank Kinsey, 82, president of the American Key Can Co., Chicago, and inventor of the key can opener, died recently at his home in Chicago after an illness of several weeks. Mr. Kinsey was one of the organizers of the company of which he became president in 1901.

Dorr E. Felt, 68, president of the Felt & Tarrant Manufacturing Co., Chicago, and inventor of the comptometer and the first practical adding and listing machines, died on Aug. 8 in that city. He was the organizer of the Felt & Tarrant Co., and sold the first calculating machine in 1887.

Edward M. Sutliff, mechanical engineer, 60, at one time president of the Eastern Tool & Tube Co., and lately a vice-president of the American Trading Co., 96 Wall St., New York, died on Aug. 11 at Hartsdale, N. Y.

L. W. Olds, 65, president of the Climax Manufacturing Co., Cory, Pa., died at his home in that city recently, following a long illness.

Walter S. Bickley, 63, former president of the Penn Steel Casting Co., Chester, Pa., died recently.

FORTHCOMING MEETINGS

THIRD INTERNATIONAL CONGRESS FOR APPLIED MECHANICS — At Stockholm, Sweden, Royal Technical Institute, week of Aug. 25. Further information from A.S.M.E., 29 West 39th St., New York City.

INTERNATIONAL CONGRESS FOR GENERAL MECHANICS — Liege, Belgium, Aug. 31 to Sept. 7. For information address Alb. Schlag, 4 Place Saint Lumbert, Liege, Belgium.

STEEL FOUNDERS' SOCIETY OF AMERICA, INC.—Regular meeting, William Penn Hotel, Pittsburgh, Pa., Sept. 10-11. October meeting at Pennsylvania Hotel, New York City, on Oct. 23, the day preceding the New York meeting of the American Iron & Steel Institute. G. P. Rogers, 932 Graybar Bldg., New York City, is managing director.

NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION—Cost Conference, Hotel Clifton, Niagara Falls, Ont., Canada, Sept. 22-23. Ernest F. DuBrul, 1415 Enquirer Bldg., 617 Vine St., Cincinnati, Ohio, is general manager.

NATIONAL METAL CONGRESS—Twelfth annual Congress and Exposition, Stevens Hotel, Chicago, Sept. 22-26. W. H. Eisenman, secretary of the A.S.S.T., 7016 Euclid Ave., Cleveland, Ohio, is director.

AMERICAN WELDING SOCIETY—Annual fall meeting, Congress Hotel, Chicago, September 22-26. W. M. Spraragen, 29 W. 39th St., New York, N. Y.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Annual fall meeting of Iron & Steel Division and Machine Shop Practice Division, Stevens Hotel, Chicago, September 22-26. P. T. Wetter, Engineering Societies Bldg., 29 W. 39th St., New York, secretary.

AMERICAN INSTITUTE OF MINING & METALLURGICAL ENGINEERS — Annual fall meeting of Iron & Steel Division, Stevens Hotel, Chicago, September 22-26. T. T. Read, 29 W. 39th St., New York, N. Y., is secretary.

AMERICAN INSTITUTE OF MINING & METALLURGICAL ENGINEERS — Annual fall meeting of the Institute of Metals Division, Stevens Hotel, Chicago, September 22-26. W. M. Corse, 29 W. 39th St., New York, N. Y., is secretary.

AMERICAN SOCIETY FOR STEEL TREATING—Annual Convention, Stevens Hotel, Chicago, September 22-26. W. H. Eisenman, 7016 Euclid Ave., Cleveland.

NATIONAL SAFETY CONGRESS—Nineteenth Annual, to be held at Fort Pitt and William Penn Hotels, Pittsburgh, from Sept. 29 to Oct. 3. Metals Section meetings will be held on Tuesday and Wednesday mornings and Thursday afternoon.

AMERICAN GEAR MANUFACTURERS' ASSOCIATION — Semi-Annual meeting, Hotel Clifton, Niagara Falls, Ont., Canada, from Sept. 29 to Oct. 1.

SOCIETY OF AUTOMOTIVE ENGINEERS — Production meeting, Hotel Book-Cadillac, Detroit, Oct. 7-8. R. S. Burnett, director, production activities, 29 West 39th St., New York City.

GRAY IRON INSTITUTE, INC. — Third Annual Convention at Hotel Cleveland, Cleveland, Ohio, October 8. Arthur J. Tuscany, Terminal Tower Bldg., Cleveland, is manager.

NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION—29th Annual Convention, Hotel Aspinwall, Lenox, Mass., October 13-15. Ernest F. DuBrul, 1415 Enquirer Bldg., 617 Vine St., Cincinnati, Ohio, is general manager.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS — French Lick Meeting, French Lick Springs Hotel, French Lick, Ind., Oct. 13-15. Calvin W. Rice, 29 West 39th St., New York, is executive secretary.

SOCIETY OF INDUSTRIAL ENGINEERS—17th National Convention, Mayflower Hotel, Washington, D. C., Oct. 15-17. George C. Dent, 1815 Engineering Bldg., 205 W. Wacker Drive, Chicago, executive secretary.

NINTH NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING —In Grand Central Palace, New York City, Dec. 1-6.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Fifty-first annual meeting, Engineering Societies Bldg., New York City, Dec. 1-6. Calvin W. Rice, secretary, 29 West 39th St., New York City.

WESTERN METAL CONGRESS AND EXPOSITION—Second National, Civic Auditorium, San Francisco, Calif., Feb. 16-20, 1931. Under auspices of A.S.S.T. W. H. Eisenman, secretary, 7016 Euclid Ave., Cleveland, Ohio.

THE INDUSTRIAL REVIEW

Weekly progress of the machinery and machine-tool business

THE following reports, gathered from the various machinery and machine-tool centers of the country, indicate the trend of business in these industries and what may be expected from the future:

NEW YORK

A really good-sized fire or a foulproof prize fight would be a welcome diversion for New York's machinery and machine tool dealers. As far as business is concerned, they realized some time ago that they might as well spend the summer at the shore, but most of them have at least made the effort to appear at the office with accustomed regularity, even though there are no prospects to visit and no prospect of prospects very soon. The latest word offers no sign of a pickup, with no inquiries, no change in prices, and the best deliveries in the history of the business. One dealer, at least, is keeping his clerical force busy making up lists of the machines he sells, standardized price estimates, and similar data which he expects to use as soon as conditions improve.

DETROIT

With most of the automobile plants again in operation and with the associated industries resuming at least part-time production, business conditions in the Detroit district are better than they have been in many weeks. No noticeable effect has been produced in the machinery and machine-tool field, however. Only a few orders have been received in the past ten days and inquiries have not increased appreciably. In general, the month of August seems to be below the expectations of the dealers and salesmen. It is better than July but has hardly reached the point that observers thought it would.

One large motor car manufacturer is purchasing a large number of special boring machines and another has made inquiries for a specialized type of equipment in the last few days. Some other scattered inquiries are being received but they are not particularly significant.

CINCINNATI

The recent drop from tropical temperatures did much to bring up the general morale and to put vigor back into selling efforts, but the market failed to respond in a like manner, trade remaining very dull. It is thought by heads of machine-tool concerns in the Cincinnati district that the business tide has ceased to ebb, and that after a short pause the waters of the sea of industry will begin to rise to a higher level.

This optimistic view of the situation is to a large extent based on the fact that an encouraging number of well-scattered and well-diversified inquiries of an "honest-to-goodness" tone are flowing in from day to day, from all sections of the country and from all classes of users. While large orders are not expected to become the sustaining feature, a good aggregate volume of business is expected to develop as the fall advances.

CANADA

Conditions in the metal-working industry throughout Canada are still unsatisfactory. Steel and locomotive plants are working on comparatively limited production, and no resumption of activities on a large scale is looked for until well on in the fall. For the first half of the current year the iron and steel industry has been operating at a capacity about 14 per cent below that of 1929. There has been a considerable decrease in automobile orders, compared with those of last month, and factories are still on part time.

The bright spot in an otherwise lethargic market is that sales of road-building and construction machinery and mining equipment have been keeping up remarkably well. Little inquiry is reported from the railroads, but a quickening is expected to develop in this field just as soon as the extent of the harvest is determined.

DAWN seems to be about to break after a long night in the country's machinery and machine-tool markets. Reports from week to week indicate a continually increasing wave of optimism which now bears in its wake the first of a flood of inquiries that really mean business in the not-too-far-distant future. Business conditions in general have shown some improvement, and the drought has been broken definitely, thus removing two much-used excuses of prospective tool buyers. In addition, machine-tool builders have shown approximately 140 new tools in the pages of *American Machinist* since July 1, a number greater than that of last year and a sterling indication that they are ready for the upturn when it comes.

NEW YORK dealers still sit quiet, preparing price lists and standardized estimates but getting few orders. Detroit reports the month below expectations, with automobile makers hoping to sell cars and hoping to buy tools—later. Cincinnati manufacturers are receiving a wave of inquiries from widely diversified sources that indicate better business in the offing. Canadian sales of road-building and construction machinery and mining equipment are increasing, but other inquiries and orders are slow.

NEW ENGLAND manufacturers and dealers, showing their age-old Yankee sagacity, are beginning to feel better with the increase of inquiries and orders, particularly of the immediate shipment variety. Southern district sales are also "perking up," with an increasing demand also for used tools. Chicago expects orders soon from automobile builders from whom inquiries have been received, and stands firm in the belief that the "world's fair."

NEW ENGLAND

Developments of the current week added encouragement to the New England situation. Discouraging features may still be pointed out, but it is more and more apparent such expressions are of the post mortem variety. Officials voice the general opinion that the turn has been really made and only genuine confidence is needed to bring a fuller measure of business.

Recent machine-tool orders invariably carry the immediate shipment tag indicating anticipations of a revival of active business on the part of the buyers. The New Britain Gridley Co. has some departments on a 24-hour schedule to complete hurry-up orders. Evidences have appeared that foreign business differences are being adjusted amicably, and this source of business is again encouraging. Two machine-tool builders, possibly others, have large foreign orders booked on which work has not been started.

SOUTHERN DISTRICT

While general business conditions throughout this area have shown little variation from those of the previous fortnight, sales of machinery and machine-tools were declared to be somewhat better. The trend, however, does not appear well marked, and judging by the scattered sources of demand there is little assurance that the improved market will continue to prevail. The dullness of past months is largely attributable to the limited buying of the railroads and the lessened activity of shipyards. Most inquiries are from miscellaneous private plants, well distributed geographically, and call, in nearly all cases, for used equipment.

Prices for practically all types of machinery and machine-tools are being satisfactorily maintained and unchanged from the previous fortnight, although some deflection is noticeable in large jobs. Deliveries continue satisfactory. Although most dealers inwardly are optimistic and feel the extended dull period is nearing an end, the uncertainty of market conditions, coupled with an apparent lessened buying power, prevails upon them to make no predictions.

CHICAGO

No apparent evidence of a speedy resumption of activity in the machine-tool industry has developed within the last week, according to all accounts. Inquiries continue to be received in fairly good volume, but are of a nature that does not encourage a belief that closing within a definite time is among the probabilities. Indications that the reopening of automobile plants will soon be felt in a material way are not lacking, several of the inquiries received coming from that source. Two or three industrialists of some importance also are included among those who are taking a renewed interest in the market by asking for prices on special machinery. The Chicago Board of Education again is heard from with a small list needed in its technical schools. As tending to show that not in every line are present conditions as bad as they might be, a representative of one of the largest tool manufacturers of the Middle West informed the writer that the demand for abrasives used in connection with the grinding machines this plant turns out in large volume is within five per cent of what it was at this time last year.

BUSINESS · BAROMETER

Fall in the commercial barometer seems to have been arrested, although the mercury moves but slowly

THEODORE H. PRICE
Editor, Commerce and Finance, New York

IT IS said that Charles James Fox, the English statesman, once wagered that he could stand on a crowded street in London and offer gold sovereigns for a shilling without selling any. He won his wager and his experience sheds an interesting light upon what might be called the psychology of the market place. Things that are in large supply or pressed for sale are not eagerly sought, whereas a frenzied demand may often be developed for an article about which an illusion of scarcity or rarity can be created.

The American stock market now and a year ago vindicates the accuracy of these observations. In August, 1929, people went mad to buy stocks with borrowed money for which 9 to 10 per cent per annum was being paid. Then the autumn panic came, liquidation ensued, and just now it is impossible to get the same buyers to purchase the stocks for which they were clamoring a year ago, even though money can be had at 2½ per cent, and the stocks themselves are quoted at less than half of what they would have cost during the summer of 1929.

The conclusion suggested is that the mood of the public, rather than the merit of the position, is the actuating factor in the speculative markets, and that men of acumen should not be afraid to swim against the current, provided they can avoid being drawn into the rapids or the whirlpools that are sometimes encountered in swift-running streams.

Basing one's conclusions upon this brief statement of present conditions it would seem safe to assume that the time to buy good securities is here or nearly at hand. No one can hope to hit the bottom except by accident. Although the money mill grinds slowly it grinds exceeding fine and the influence of abundant credit should be felt with reasonable promptitude.

Meantime it is worth noting that a slightly better feeling is reported from most commercial centers. Trade has been somewhat quickened by the advance in grain and although the drought which caused this advance must be counted as one of the country's great disasters, its influence seems likely to revive speculation, quicken enterprise, and lead to an increase of activity in many lines. This has been true of a great many of the disasters which have afflicted America and Europe from time to time.

The San Francisco fire was a noticeable case in point. It is now generally agreed that the losses it caused were more than offset by the activity that it inspired, and even the World War, ended nearly twelve years ago, is now regarded by many as responsible for the great increase in wealth that has taken place during the last decade.

The policy that President Hoover has pursued in organizing relief measures for those who suffered by the drought is most commendable, and it may be counted as one of the factors that will make for the business revival which already promises in some of the regions that are contiguous to the drouth-stricken areas.

But the story of Charles James Fox and the sovereigns that he failed to sell at a shilling apiece has additional significance when considered in connection with the dragging commodity markets that were recorded last week. Cotton is the lowest for the season thus far. So are rubber and cocoa. But silk, sugar, and coffee are but little above the bottom touched this season.

As to the drought and its effect, it is difficult to speak with certainty as yet and it is a possibility that some of the blighted crops may recover at least part of their vigor. It is also possible that the damage has been exaggerated. But the important factor is that people have had their eyes opened to the possibility of a shortage in the supply and that prices can go up as well as down.

Of distributive trade it is impossible to speak precisely, but an improvement in some lines is undeniable, and with a revival of the commercial enterprise which was rendered inert by the panic in the stock market it is quite possible that we may see a winter of activity.

Reading between the lines, a gain in automobile output seems to be assured. Definite statistics are not, however, as yet available, although various automobile manufacturers seem to be increasing their shop forces and a little less is heard about unemployment.

In Europe the situation is reassuring except that excessive rains in certain sections are said to have injured some crops. The news from China would be disturbing were it not for the fact that most Americans believe that China's wars are conducted for revenue only and that the casualties are not serious or numerous.

To the far-seeing man the most impressive features of the foreign situation are the decline in international trade and the possibility that the British Empire may undertake to build a tariff wall around herself. But the world has learned to change its orientation with great facility and it hardly seems necessary to discuss seriously the contingencies suggested until they become more imminent than at present.

Meanwhile the fall in the commercial barometer seems to have been arrested, and although the mercury moves but slowly it shows a rising tendency and is slightly above last week's figure.

THE BUSINESS WEEK

August 20, 1930

"BUSINESS activity increased last week and our indicator moved upward for the first time since the beginning of July. It stands at 87.4% of normal as compared with 86.5% a week ago and 113.7% a year ago. . . . The upturn occurred in spite of disposition of many business men to sit tight until effects of the drought can be more accurately appraised. These, as early exaggerations fade, will be discovered not to be calamitous. . . . There is reason to believe the worst is over—that recovery has begun; that it will be rapid as compared with recovery in 1921. . . . Check payments increased last week; so did freight shipments of commodities most representative of commercial activity. . . . Productive activity decline is less steep. . . . Chicago grain traders evidently agree with us that early drought damage reports were exaggerated; grain prices sagged. . . . Other raw material prices continue to weaken. . . . Approach of fall weather will start the seasonal upswing; renewed buying will strengthen prices. . . . Sentiment in financial quarters continues to lag behind sentiment in commercial circles. Banking caution, not to say timidity, is retarding business. . . . Too much importance is still being attached to the figures on the ticker tape; stock prices rise and fall in a purely professional market."

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THE WEEKLY PRICE GUIDE . . . .

Rise and Fall of the Market

PRESENT active inquiry for shapes in the Metropolitan building market, and pending awards for line-pipe in the West, leave little else of importance in the way of current steel demand. Buying appears exceptionally slow in butt-weld pipe, seamless mechanical tubing and boiler tubes. Drought has weakened sales prospects in agricultural steel. Moreover, there seem to be few chances of early recovery in automotive production. Steel prices, therefore, remain untested, awaiting an anticipated upturn in demand this fall. Non-ferrous metals, on the other hand, appear in better light this week. Babbitt prices are gaining ground; the copper market is firm; a fairly good volume of demand has developed for lead in carloads. Tin prices, however, have weakened further, while consumers appear to be pretty well covered on zinc requirements.

(*All prices as of August* 15, 1930)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b.:

CINCINNATI	
No. 2 Southern (silicon 1.75@2.25)	$16.69@$18.19
Northern Basic	19.89@ 20.39
Southern Ohio No. 2	19.89@ 20.39
NEW YORK—Tidewater Delivery	
No. 2 Southern (silicon 1.75@2.25)	18.00@ 18.50
BIRMINGHAM	
No. 2 Foundry (silicon 1.75@2.25)	14.00
PHILADELPHIA	
Eastern Pa., No. 2x (silicon 2.25@2.75)	20.00
Virginia No. 2	18.75@ 19.25
Basic	22.29
CHICAGO	
No. 2 Foundry, local (silicon 1.75@2.25)	19.00
No. 2 Foundry, Southern (silicon 1.75@2.25)	18.20
PITTSBURGH, including freight charge ($1.76) from Valley:	
No. 2 Foundry	19.63@ 20.13
Basic	19.63@ 20.13
Bessemer	20.76

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb.:

Detroit	4.50
Cleveland	5.00
Cincinnati	4.50
New York	5.25
Chicago	4.50@4.75

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots:

Blue Annealed*	Pittsburgh Mill Base	Chicago	Cleveland	New York
No. 10	1.95@2.15	3.35†	3.00	3.40†
No. 12	2.00@2.20	3.45†	3.10	3.45†
No. 14	2.10@2.30	3.55†	3.20	3.50†
No. 16	2.20@2.40	3.65†	3.30	3.60†
Black				
Nos. 18 to 20	2.25@2.35	3.85†	3.40	3.45@3.70
No. 22	2.40@2.50	4.00†	3.55	3.60@3.85
No. 24	2.45@2.55	4.05†	3.60	3.65@3.90
No. 26	2.55@2.65	4.15†	3.70	3.75@4.00
No. 28	2.70@2.80	4.75†	3.85	3.90@4.15
Galvanized				
No. 10	2.40@2.50	3.90†	3.65	3.55
Nos. 12 to 14	2.50@2.60	4.00†	3.75	3.65
No. 16	2.60@2.70	4.10†	3.85	3.75
No. 18	2.75@2.85	4.25†	4.00	3.90
No. 20	2.90@3.00	4.40†	4.15	4.05
No. 22	2.95@3.05	4.45†	4.20	4.10
No. 24	3.10@3.20	4.60†	4.35	4.25
No. 26	3.35@3.45	4.85†	4.60	4.50
No. 28	3.60@3.70	5.10†	4.85	4.75

*Light Plates. †400 to 3,999 lb.

WELDED STEEL PIPE—Warehouse discounts are as follows:

	New York Black	New York Galv.	Cleveland Black	Cleveland Galv.	Chicago Black	Chicago Galv.
1 to 3 in. butt	56.14%	43.6%	53.3%	42.3%	57.3%	44.8%
3½ to 6 in. lap	52.72%	40.18%	50.8%	37.8%	53.9%	41.4%

WROUGHT-STEEL PIPE LIST

Size, Inches	List Price per Foot	Diameter in Inches—External	Diameter in Inches—Internal	Thickness Inches
⅛	$0.17	1.315	1.049	.133
¼	.23	1.66	1.38	.14
⅜	.27⅓	1.9	1.61	.145
½	.37	2.375	2.067	.154
¾	.58½	2.875	2.469	.203
1	.76½	3.5	3.068	.216
1¼	.97	4.0	3.548	.226
1½	1.09	4.5	4.026	.237
2	1.48	5.563	5.047	.258
2½	1.92	6.625	6.065	.28
3	2.50	8.625	8.071	.277

SEAMLESS STEEL TUBING—Following net prices are for seamless mechanical tubing, cold drawn, round, .10 to .30 carbon, at New York warehouse in lots of less than 100 ft. or 100 lb.:

Thickness—Decimal	B.w.g. and Fractions	Outside Diameter in Inches—⅛	¼	⅜	½	⅝	¾	⅞	1	1¼	1½
		Price per Foot									
.035″	20	$0.15	$0.16	$0.17	$0.18	$0.19	$0.21	$0.23			
.049″	18	.17	.18	.19	.20	.21	.23	.25			
.065″	16	.19	.20	.21	.22	.23	.25	.27			
.083″	14	.20	.22	.23	.24	.25	.27	.29			
.095″	13	.21	.23	.25	.26	.27	.29	.31			
.109″	12	.22	.24	.26	.27	.28	.30	.32			
.120″ or .125″	11	.23	.25	.27	.28	.29	.31	.33			
.134″	10	.24	.26	.28	.29	.30	.32	.34			

MISCELLANEOUS—Warehouse base prices in cents per lb.:

	New York	Cleveland	Chicago
Spring steel, light*	4.50	4.65	4.65
Spring steel, heavier	4.00	4.00	4.00
Coppered Bessemer rods	6.05	6.00	6.20
Hoop steel	3.75†	4.00	3.75†
Cold rolled strip steel	4.95	6.00	6.10
Floor plates	4.85†	5.30	5.00†
Cold fin., round or hexagon‡	3.40	3.65	3.35
Cold fin., flat or square‡	3.90	4.15	3.85
Structural shapes	3.10†	3.00	3.00†
Soft steel bars	3.10†	3.00	3.00†
Soft steel bar shapes	3.10†	3.00	3.00†
Soft steel bands	3.40†	3.65	3.20†
Tank plates	3.10†	3.00	3.00†
Bar iron (2.75 at mill)	3.24	3.00	3.00
Drill rod (from list)	60%	55%	50%

*Flat, 3/16-in. thick by ¾-in. wide. †400 to 3,999 lb., ordered and released for shipment at one time. ‡Cold finished steel, shafting and screw stock.

Electric welding wire at New York warehouse—3/32, 8.35c. per lb.; ⅛, 7.85c. per lb.; 5/32 to ⅛, 7.35c. per lb.

METALS

Warehouse Delivery Prices in Cents Per Lb. for Small Lots:

Copper, electrolytic, New York			12.50
Tin, Straits, pigs, New York			32.50@33.50
Lead, pigs, E. St. Louis	5.35	New York	6.50@ 7.00
Zinc, slabs, E. St. Louis	4.30	New York	6.25@ 7.25

	New York	Cleveland	Chicago
Antimony, slabs	10.00@10.50	10.25	10.75
Copper sheets*	20.75	20.75	20.75
Copper wire*	13.00	13.87½	13.12½
Copper, drawn, round*	19.25	19.25	19.25
Copper tubing*	23.00	23.00	23.00
Brass sheets, high*	17.87½	17.87½	17.87½
Brass tubing, high*	22.75	22.75	22.75
Brass rods, high*	16.12½	16.12½	16.12½
Brass wire, high*	18.37½	18.37½	18.37½

*Mill, base.

SHOP MATERIALS AND SUPPLIES

METALS—Continued

	New York	Cleveland	Chicago
Aluminum ingots, 99%†	23.30	24.30	23.30
Zinc sheets (casks)	9.75@10.25	11.25	10.11
Solder (½ and ½)	24.50	23.50	22@24

Babbitt metal, delivered in case lots, New York, cents per lb.:

Genuine, highest grade	50.00
Commercial genuine, intermediate grade	37.00
Anti-friction metal, general service	31.00
No. 4 babbitt, f.o.b.	10.50

†F.O.B.

NICKEL AND MONEL METAL—Price in cents per lb., base, f.o.b. Huntington, W. Va.:

	Nickel	Monel Metal
Sheets, full finished	52.00	42.00
Sheets, cold rolled	60.00	50.00
Strip, cold rolled	55.00	45.00
Rods, hot rolled	45.00	35.00
Rods, cold drawn	50.00	40.00
Tubing	75.00*	90.00†
Angles, hot rolled	50.00	40.00
Plates	52.00	42.00

*Seamless. †Welded.

OLD METALS—Dealers' purchasing prices in cents per pound, f.o.b. cars:

	New York	Cleveland	Chicago
Crucible copper	9.00@9.25	9.00	8.75@ 9.25
Copper, heavy, and wire	8.25@8.50	8.75	8.00@ 8.50
Copper, light, and bottoms	7.25@7.75	8.50	7.00@ 7.50
Heavy lead	4.00@4.12½	4.00	3.50@ 4.00
Tea lead	2.00@2.25	2.50	2.50@ 3.00
Brass, heavy, yellow	5.00@5.25	5.00	5.00@ 5.50
Brass, heavy, red	7.25@7.50	7.75	7.25@ 7.75
Brass, light	4.00@4.25	4.00	4.50@ 5.00
No. 1 rod-brass turnings	5.00@5.25	5.00	5.00@ 5.50
Zinc	2.00@2.25	1.50	1.75@ 2.00

TIN PLATES—Charcoal—Bright—Per box:

"AAA" Grade:	New York	Cleveland	Chicago
IC, 14x20	$12.10	$11.95	$11.50
"A" Grade:			
IC, 14x20	9.70	9.90	9.50
Coke Plates—Primes—Per box:			
100-lb., 14x20	6.45	6.10	7.00
Terne Plates—8-lb. Coating—Small lots—Per box:			
IC, 14x20	7.75@8.00	7.00	7.50

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb.	$0.13	$0.16	$0.15
Cotton waste, colored, per lb.	.09½	.12	.12
Wiping cloths, washed, white, per lb.	.13½	38.00 per M	.16
Sal soda, per lb.	.01½	.02	.02
Roll sulphur, per lb.	.028	.03½	.04
Linseed oil, raw, in 1 to 4 bbl. lots, per lb.	.142	.164	.146
Cutting oil, about 25% lard, in 5 gal. cans, per gal.	.65	.60	.65
Machine oil, medium-bodied (55 gal. steel bbl.) per gal.	.33	.36	.24
Belting—Present discounts from list in fair quantities (½ doz. rolls) for leather or rubber:			
Leather—List price, 24c. per lin.ft., per inch of width, for single ply:			
Medium grade	30–10%	30–10%	35%
Med. grade, heavy wgt.	30%	30 –5%	30%
Rubber transmission, 6-in., 6 ply, $1.83 per lin.ft.:			
First grade	50%	50–10%	50%
Second grade	60%	60– 5%	50–10%

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars	per lb.	$0.031	$0.0325	$0.0325
Cold fin. shafting	per lb.	.034	.034	.036
Brass rods	per lb.	.1612½	.165	.2125
Solder (½ and ½)	per lb.	.245	.245	.3375
Cotton waste, white	per lb.	.13	.13	10@.13½
Disks, aluminum oxide mineral, cloth, No. 1 6-in. dia	per 100	4.59	4.59	3.60
Lard cutting oil	per gal.	.65	.65	.75
Machine oil	per gal.	.33	.33	.33
Belting, leather, medium	off list	30–10%	30–10%	30–10%
Machine bolts, up to 1x30 in., full kegs	off list	50–10%*	50–10%*	50–10%*

*List prices as of April 1, 1927

MISCELLANEOUS—Continued

	New York	Cleveland	Chicago
Abrasive materials — Standard grade, in sheets 9x11 in., No. 1, per ream of 480 sheets:			
Flint paper*	$6.03	$6.03	$6.03
Emery cloth*	25.87	25.87	25.87
Disks, aluminum oxide mineral, 6 in. dia., No. 1, per 100:			
Paper†	2.61	2.61	2.61
Cloth†	4.59	4.59	4.59
Fire clay, per 100 lb. bag	1.00	.75	.75
Coke, prompt furnace, per net ton	Connellsville,		2.50@2.60
Coke, prompt foundry, per net ton	Connellsville,		3.50@4.85
White lead, dry	100 lb. kegs	New York,	13.75
White lead, in oil	100 lb. kegs	New York,	13.75
Red lead, dry	100 lb. kegs	New York,	13.75
Red lead, in oil	100 lb. kegs	New York,	15.25

*Less than 3 reams. †Less than 200.

SHOP SUPPLIES

Discounts from new list dated Apr. 1, 1927, applying on immediate deliveries from warehouse stocks in New York and vicinity:

Machine bolts:	
Up to ¾-in. x 6-in., full kegs, list less	60%
Larger, up to 1 x 30-in., full kegs, list less	50–10%
Less than full kegs or case lots, add to list	10%
Fitting-up bolts: list less	45%
Lag screws:	
Up to ½-in. x 6-in., list less	60%
Larger, list less	50–10%
Less than full keg or case lots, add to list	10%
Rivets:	
Structural, round head, full kegs, net	$4.50
Structural, round head, broken kegs, net	6.00
Tank, 7/8-in. dia. and smaller, list less	60%
Nuts:	
Hot pressed, square or hexagonal, blank or tapped:	
Full kegs up to 1-in., incl., list less	60%
Larger, up to 3-in., list less	40–10%
Less than keg or case lots, add to list	10%
Washers:	
Wrought, full kegs, per 100 lb., list less	$4.00
Wrought, broken kegs, per 100 lb., list less	2.00
Turnbuckles:	
With stub ends, list less	20%
Without stub ends, list less	50%
Chain:	
Proof coil, base, per 100 lb., net	$8.50
Cast iron welding flux, per lb., net	.35
Bronzing flux, per lb., net	.50

MACHINE REQUIREMENTS AND INDUSTRIAL CONSTRUCTION

Equipment Wanted

Calif., Oakland—East Bay Municipal Utility Dist., 512 16th St., J. H. Kimball, Secy.—engine-driven 200-amp. electric welder mounted on steel skids with complete equipment.

Ind., Evansville—Metal Process Co.—two overhead electric cranes for proposed factory. Estimated cost $250,000.

Mass., Boston—Joseph Beal & Co., 465-471 Atlantic Ave.—six 14 in. x 6 ft. tool room lathes; ten manufacturing lathes, 18 to 60 in. swing and 8 to 20 ft. beds; three vertical boring mills, 24, 36 and 48 in; two horizontal boring mills, three shapers, 18, 20 and 24 in.; 3, 4 and 5 ft. radial drills, four Universal millers, Nos. 1 to 2; two Warner & Swasey turrets No. 2A and 3A.

Mass., Edgartown—P. O. Box 264—upright hoisting winch.

Mich., Detroit—Detroit Gray Iron Foundry, 6403 Wight St.—iron foundry equipment for proposed 2 story, 115 x 170 ft. foundry on Meldrum Ave. Estimated cost $50,000.

Ont., Galt—Galt Malleable Iron Co., Kerr St., H. J. Bassett, Gen. Mgr.—additional foundry equipment for proposed 1-story, 62x162 ft. addition to foundry.

Ont., Hamilton—Canada Iron Foundries, Queen St., W. A. Hastings, Mgr.—interested in prices on complete equipment for machine and pattern making shops destroyed by fire.

Ont., Hamilton—Dominion Foundries & Steel Ltd. C. W. Sherman, Gen. Mgr.—equipment for the manufacture of plate steel. $250,000.

Opportunities for Future Business

Ark., Little Rock—Bale Chevrolet Co., 411 West Capital St., awarded contract for a 1 story, 140 x 200 ft. garage, warehouse and service station. Estimated cost $200,000.

Calif., Redondo Beach—Redondo Beach Union High School Dist., is receiving bids for a shop and gymnasium. Allison & Allison, California Reserve Bldg., Los Angeles, Archts. Noted July 10.

Calif., San Francisco—L. Ebbets, Call Bldg., Archt., is preparing plans for the construction of a 2-story automobile assembly plant at Mission District. Estimated cost $100,000. Owners name withheld.

Calif., South San Francisco—Seattle Chain Mfg Co., 6921 East Marginal Way., Seattle, Wash., awarded contract for the construction of a 1-story factory here. Estimated cost to exceed $40,000.

Conn., Hartford — Terry Steam Turbine Co., Windsor St., awarded contract for a 2 story addition to factory. Estimated cost $40,000.

Ga., Atlanta—Eastern Air Transport, Inc., R. F. Shelton is receiving sub-bids in connection with additions to shop and service building. Noted Aug. 14.

Ill., Niles Center—Chicago Rapid Transit Co., 72 West Adams St., Chicago, has work under way on a 1-story, 200x282 ft. repair shop at Oakton St. and Hamilin Ave., here. Estimated cost $375,000.

Ind., East Chicago—Van Semus Bros., Hammond, awarded contract for a service station at Hohman St. and Standard Ave. here. Estimated cost $40,000.

Ind., Evansville—Mead-Johnson Co., awarded contract for the construction of a factory on South St. Joseph St. Estimated cost $40,000.

Ind., Fort Wayne—T. E. Snook, awarded contract for the construction of a service station at 502 West Jefferson St. Estimated cost $41,100.

Ind., Gary—National Tube Co., will build addition to plant. Estimated cost $2,000,000. Private plans. Work will be done by owner's forces.

Ind., Gary—Standard Oil Co., awarded contract for the construction of a service station at 5th and Taylor Sts. Estimated cost $40,000.

Ind., Lafayette—Shell Corp., awarded contract for the construction of a machine shop and service station at 4th and South Sts. Estimated cost $42,000.

Ind., South Bend—Roach-Appleton Co., manufacturers of electrical supplies, awarded contract for the construction of a 1 story, 200 x 250 ft. factory. Estimated cost $100,000.

Every one of these items is reported by our authorized correspondents who are instructed to verify every item sent in. This free weekly service is published in the interests of the buyer and the seller, to bring them together and get machinery moving.

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BUSINESS NEWS DEPARTMENT
Tenth Ave. at 36th St., New York

Ind., Indianapolis—F. C. Tucker & Co., 215 Peoples Bank Bldg., will build a machine shop and service station at East Washington St. and Hawthorne Lane. Estimated cost $40,000. Work will be done by owners forces.

Me., Van Buren—Edward LaCroix plans to rebuild lumber mill. Estimated cost $40,000. Private plans. Work will be done by owner's forces.

Mass., Boston—Boston Elevated Railway Co., Park Sq. Bldg., awarded contract for the construction of a 1 story garage at Washington and Bartlett Sts. Estimated cost to exceed $40,000.

Mass., Cambridge (Boston P. O.)—American Oil Co. of Massachusetts, 465 Rindge Ave., will soon award contract for the construction of a 1-story garage and service station at 104 Mt. Auburn St. Estimated cost $60,000. Noted Aug. 7.

Mass., Cambridge (Boston P.O.)—F. W. Webster Co., 340 Congress St., Boston, manufacturers of typewriter supplies, awarded contract for a 4 story, 100 x 200 ft. factory at Wadsworth and Hayward Sts. Estimated cost to exceed $40,000. Noted July 31.

Mass., East Fitchburg—Simonds Saw & Steel Co., G. K. Simonds, Gen. Mgr., is having plans prepared for a 360 x 550 ft. factory on Railroad St. Estimated cost $1,000,000. Private plans.

Mass., Everett—New England Fuel & Transportation Co., 201 Rover St., awarded contract for a coke plant and factory. Estimated total cost $50,000.

Mass., New Bedford—J. S. Neves, Jr., 321 Dartmouth St., plans the construction of a 1 story automobile service and repair shop at Rockdale Ave. and Dartmouth St. Estimated cost $50,000. Private plans.

Mass., Springfield—Dept. of Streets, City Hall, is receiving bids for the construction of a 1 story repair shop and storage building on Taylor St. Estimated cost $50,000. McClintock & Craig, 458 Bridge St., Archts. Noted June 5.

Mo., St. Louis—Pavely Dairy Co., 1001 South Grand Blvd., awarded contract for a 1-story, 134x300 ft. garage at LaSalle St. and Motard Ave. Estimated cost $100,000.

N. J., East Rutherford — East Rutherford Syringe Co., 75 Mozart St., is having plans prepared for the construction of a 2 story factory. Estimated cost $40,000. J. T. Camlet, 26 Piaget Ave., Clifton, Archt.

N. J., Hawthorne—J. C. Van Vlandren, 140 Market St., Paterson, Archt., will receive bids about Oct. 15 for a 2 story, 90 x 140 ft. garage at Nelson and Pasadena Aves. here for S. Braen, 115 Totowa Ave., Paterson. Estimated cost $150,000. Noted Aug. 7.

N. J., Newark—J. Black, 246 Central Ave., awarded contract for the construction of a 2 story auto radiator shop and garage at 268-274 Central Ave. Estimated cost $50,000. Noted July 31.

N. J., Newark—M. N. Shoemaker, 15 Central Ave., Archt., is receiving bids for a 3 story, 50 x 100 ft. woodworking plant on New York Ave. for John C. Kohaut Inc., 117 Green St. Estimated cost $40,000.

N. Y., Brooklyn—Bd. of Education, awarded contract for the construction of a technical high school. $3,453,900.

N. Y., Newark—Dept. of Mental Hygiene, Capitol, Albany, received lowest bid for the construction of a shop building at Newark State School here from Felton Construction Corp., 1450 Michigan Ave., Buffalo. $24,568.

O., Youngstown—Anson Aero Mfg. Co., plans the construction of a 1-story factory for the manufacture of airplanes on Meridan Rd. Estimated cost $100,000.

Pa., Oil City—Cities Service Co., C. Kinder, Mgr., Titusville, awarded contract for a 1 story, 26 x 51 ft. service station at Main and Petroleum Sts. here. Estimated cost $40,000. Noted July 24.

Pa., Philadelphia—Midvale Co., 4300 Wissahicken Ave., awarded contract for a 2 story, 50 x 100 ft. laboratory and office at Roberts Ave. and Blabon St. Noted July 3.

R. I., Lincoln—Dept of State Police, will soon award contract for the construction of a 1 and 2 story garage and police barracks. Estimated cost $75,000. Jackson, Robertson & Adams, Turks Head Bldg., Providence, Archts.

Ont., North Bay—S. B. Coon & Son, 4 St. Thomas St., Toronto, Ont., Archts., will receive bids until Aug. 25 for a 3-story, 35x110 ft. vocational school including four shops, etc., on Ferguson St. for Bd. of Education. Estimated cost $225,000.

Wash., Seattle—American Can Co., Elliott and Vine Sts., awarded contract for a 2 story factory on Railroad Ave. Estimated cost $1,000,000. C. J. Fries, c/o owner, Engr.